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GAS JOURNAL

LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXV. No. 3170.] LONDON, FEBRUARY 13, 1924. [76TH YEAR. PRICE 1s.

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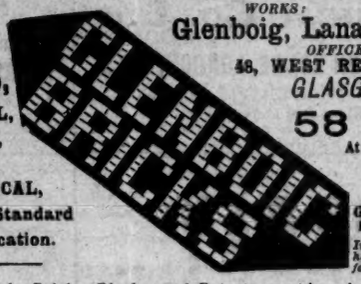

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VOL. CLXV., No. 3170.] WEDNESDAY, FEBRUARY 13, 1924. [76TH YEAR.

EDITORIAL NOTES.

Therm Standard Price Revision.

A LONG report by the Public Control Committee appeared in the *agenda* of the London County Council for their meeting yesterday. It deals in the first place with the action of the Council in connection with the therm inquiry, and with the proceedings before, and the findings of, the Departmental Committee, which have done so much to reinforce the foundations and application of the therm system. This is now all ancient history; and it seems rather late in the day to be occupying so much space with it in the Council's records. The question of the revision of therm standard prices fixed in the times of higher costs is something of more modern importance. A considerable amount of space is also devoted to this, and to the proceedings relating to the inquiry before the Director of Gas Administration into the extent to which the Gas Light and Coke Company's standard price should be reduced. But we think the Public Control Committee take a little too much credit to themselves and the Council for the reduction eventually made, seeing that the Company had admitted that the standard would have to be lowered, and as a matter of fact had not utilized the high standard to declare the dividend they could have paid had they the profits available or to spare for the purpose. As a matter of fact, they had reduced the price per therm to the consumers to the lowest possible point consistent with a secure financial position.

The Committee in their report say the principal advantage from the consumers' point of view of a reduction in the standard price is that it makes the sliding-scale fully effective, and thus provides a powerful incentive to the Company to effect economies and increase their business, since every reduction in price of 1d. a therm entitles them to declare an additional dividend of 13s. 4d. p.ct. on their 4 p.ct. stock. The Committee omit to state, for comparative purposes, that 1d. per therm is equivalent to 5d. per 1000 c.ft.; and therefore the increase in dividend is 2s. 8d. per 1d. per 1000 c.ft. The voluntary action of the Company in reducing gas charges and restricting dividends while in possession of a high standard price shows that it is not only the sliding-scale that is an incentive to wise administration and to efforts to effect economies and increase the business. A better test of a gas company's good faith in public service could not have been given; and what is true of the Gas Light Company is true of many others. The report itself acknowledges the voluntary action in restricting dividends; but it also says "the substantial reduction in the standard price supplies ample justification (if such were needed) of the action taken by the Council on behalf of London gas consumers." The Company themselves prior to that action had shown, in a very material manner, their interest in the London gas consumers. We are afraid there is rather a strong disposition on the part of the Public Control Committee to allocate to themselves too much credit, while making very stinted acknowledgment of the course the Company had pursued, despite the great liberty given to them by the original therm standard price. Some of the Sunday newspapers, referring to this report, announced "cheaper gas" for London gas consumers. They seem to find it difficult to discriminate between standard gas prices and the actual charges to the consumers. The gas consumers in the Gas Light area have something to be thankful for that they are being charged 8·6d. per therm, and not the reduced standard price of 11d.

As is known, the Council have lodged an application for the amendment of the standard price of the Commercial Gas Company; and the Public Control Committee state that they have still under consideration the question of the action to be taken with a view to securing a revision of the standard price applicable to the three remaining Companies supplying gas in the London area—the Brentford, the South Suburban, and the Wandsworth, Wimbledon, and Epsom District Gas Companies. We may therefore expect further movements on the part of the Council, further reports, and further self-issued testimonials to the keen interest of the Council in protecting the interests of the gas consumers—which the companies themselves are already doing, being directed as they are by men who know their business, and are influenced by what is right and fair.

Ratepayers' and Coal Consumers' Interests in the New Parliament.

THE greater feeling of confidence that was engendered immediately after the composition of the Labour Government was disclosed has had an uncomfortable shock through the action of the Minister of Health (Mr. John Wheatley) in remitting the surcharge upon the Poplar Guardians in respect of extravagant outdoor relief, which, by the way, has nothing whatever to do with the question before the Law Courts as to the payment of a minimum wage by the Poplar Borough Council of £4 a week. The action of the Minister appears to have been of an individual nature, without reference to the Cabinet. The possession of such big powers is new to him; and apparently he intends to exercise them in the manner that he thinks best, without troubling his colleagues. The decision has precipitated the Government at this early stage into a position which is giving them cause for serious reflection. Ratepayers throughout the country see in this initial move the sanctioning of extravagance by boards of guardians in respect of outdoor relief; and naturally they find in it, too, an inducement to unemployed not to seek employment, and therefore an incentive to remain idle and unproductive. Public utility concerns are among the largest of ratepayers—gas undertakings being one of the principal of them; and all extravagance of this kind will be heavily felt by them, and their customers must inevitably be the sufferers. Ratepayers throughout the country are alarmed; and the Government are obviously perturbed by the rapid spread of protest at the unconscionable action of one of themselves.

An explanation has been issued which tries to minimize the action, which it is said does not "involve or imply any alteration in general poor law policy," and any expenditure on relief which is excessive or otherwise unlawful will continue to be liable to disallowance or surcharge. But the broad fact remains that the Board of Guardians which have shown the most callous disregard of the ratepayers' interests in exercising their powers of outdoor relief have received absolution from the Minister of Health. It is not to be marvelled at that the number of persons receiving outdoor relief in proportion to the population is in Poplar nearly double what it is in similar London Boroughs. However, this exercise of clemency towards an extravagant local body is a matter for large ratepayers such as gas undertakings; and they will no doubt do their part in making their voices heard amid the protest over the indulgent attitude of one of our present Ministers. The subject is to be raised in Parliament, and probably this will have been done before this issue of the "JOURNAL" reaches our readers.

There is another question which will no doubt be raised at an early date in Parliament, and which has considerable concern for gas undertakings as large consumers of coal. The miners have a big representation among the Labour members of the House; and they have great strength in the Government. They will consequently make their influence felt in matters which affect the coal-mining industry. There is the notice that has been given for the termination of the national wages agreement in the industry. That notice is to be used as a lever in the attempt to obtain a new agreement (whether or not reasonable and fair) which will accord with the views of the Miners' Federation; and there is to be political action in the endeavour to realize conditions that will facilitate the attainment of objects which figure in the policy of the Federation. Nationalization of the mining industry is an item in the programme of the Socialist-Labour Party; but the Government are diplomatic enough to know that they must go easy in this respect until (if ever) they get a numerically dominant power in the House. A step towards nationalization is hinted at in something which is nebulously called "unification;" and it is the impression of some of the miners' representatives that unification is one means of solving the problem raised by the notice to terminate the national wages agreement. We may hear more about this in the near future. The object appears to be to pool or unite everything in the industry. But to try to synthetize incompatibles is not a productive course. One cannot unite good and bad without lowering the productivity of the good; but the miners contend that it is the only way to produce uniformity, in order that the miners, under whatever conditions they are working, may realize equality of, or equitable, pay. There is no intention on their part that the miners themselves shall do anything to help in the production of better wage conditions. Thus unification is one method which they have selected for attaining their ends; and, supplementing this, it is, in their opinion, the simplest thing in the world to make the consumer pay something extra—in order, though the price of coal is 100 p.ct. more than pre-war, to satisfy their ideas as to the levelling-up of pay. The question whether the consumers are able and willing to pay an increased price does not enter into their consideration. A little pamphlet which has been issued on the subject of unification in the coal-mining industry says: "The foreigner would certainly not pay, and would "turn elsewhere for his requirements, for America has "almost limitless supplies, and Germany, our most formid-"able competitor before the war, will again have to be "reckoned with in the future. But the colliery owners and "the miners could make an alliance against the home con-"sumer, and make him bear, not only his own share of "the increase, but the foreigner's as well." This prospect a coal-consuming industry, such as that of gas supply, would not view with equanimity. The pamphlet tells us that it is because the coalowners are convinced that such a course would be disastrous to the interests of the public, and of trade, commerce, and industry—entailing as it must do a rise in the cost of living, and of all articles into the production or transport of which coal enters—that they have not seen their way to agree to the miners' proposals to raise the price of coal by the necessary amount (3s. a ton on the average) to increase wages to the extent demanded. Such an addition to the cost of coal would mean an increased burden on the gas industry and its customers for gas of about £3,000,000 per annum.

However, unification, with an increased price to consumers, is one means by which the miners' leaders are of opinion their requests can be complied with. There are several ways in which unification can be brought about—if practicable. The colliery owners could form a central selling organization for the regulation of the price of coal, and the elimination of competition between individual collieries. This would necessarily involve the standardization of individual outputs to be bought by the selling agency, and periodical instructions for the restriction of output. There is co-operation—as advocated by Sir Arthur Duckham and Sir Richard Redmayne—with the view to reducing the cost of production. "Co-operation" is an elastic term. It might include the linking-up of collieries to avoid competition; a centralized system of purchasing stores, centralized pumping, and to some extent winding, plants; abolition of "eccentric boundaries;" centralized power stations; improved methods of sorting and cleansing coal, and of treating the duff or the coal from poor seams. Whether there would be any substantial economies derivable from these developments is not stated—that is to say, "substantial economies" over present methods. Then there is the amalgamation of all collieries; but this is proposing the uniting of like with unlike. Coal differs at each colliery, and in each seam; one pit may be easily worked, another most difficult to operate. The cost of winning the coal may vary considerably. It is quite clear that indiscriminate and unsuitable amalgamations would considerably hamper development. There are other means of unification; but they all tend to the one thing—Government control, or nationalization. This we do not want.

Sufficient has been said to indicate that large ratepayers and coal consumers such as gas undertakings are likely to find questions raised in the new Parliament which will be of considerable importance to them; and the interests of large ratepayers and coal consumers are not those which will, at the hands of the Government, have first consideration. But as Mr. Clynes has recently said, while we have a Labour Government, we have not a Labour Parliament. Perhaps that is something for which there is cause to be thankful, in view of the strong socialistic tendencies of some members of the Government.

Hyperbolic Claims.

Probably no industry can assert that, during the past two decades, it has had so much experimental work, research, and money lavished upon it as low-temperature carbonization. The money and time that have been expended in the effort to develop a practical process have been immeasurable. Withal, we are still lingering in the region where the proof of commercial success, and that of an uncertain order with the oscillations of markets, has still to be realized. There has lately been a flood of propaganda in connection with the system, in the shape of articles in, and letters to, the newspapers. It is really remarkable how many people have had data at disposal, and much to say, as to the results of carbonizing coal at low temperatures, although many of them, it is safe to declare, have never been responsible for carbonizing a ton of coal in their lives. Nevertheless, they have talked at large on the beauties of the system, and of the value of the semi-coke, oil, and motor spirit results, and in language and with an assurance that must have made intelligent laymen wonder why all these things have taken so long to divulge themselves, and to attain a practical materialization. But the results published to-day, from (on the surface) different quarters, have a strong likeness one with the other, and with the results published a decade and more ago, though there is frank acknowledgment that the early results were not obtained under unimpeachable technical conditions. Yet they bore a striking similarity to those that are now presented to the admiring gaze of some people by systems that have been developed, so it is said, to a technical perfection.

However, it is a pity that there should be any misrepresentation by the inflation of results, or by the ignoring of necessary qualification, or by reticence in fully stating the working conditions. This is an old trouble with inventors and advocates of new systems. The idea of putting the best complexion possible on their work or on the system they desire commercially to exploit, is something which grows; and we are afraid—in fact, we know—that it has grown rather luxuriantly in connection with low-temperature carbonization. It is an all too common thing for inventors, and those who engage in the commercial development of new systems, to take (for example) test results obtained under the most perfect conditions and by the exercise of the most scrupulous care, and to promulgate them as being identical with those that are realizable under ordinary working conditions. In connection with low-temperature as with high-temperature carbonizing systems, too, not only is it perfect design and construction, with highly efficient handling of the plant, that contributes to the production of maximum results, but in their realization the chemical and physical qualities of the coal have their important part. In the propagation of the virtues of low-temperature carbonization, results are now invariably quoted which could only be obtained under the most exacting conditions of working, and with the use of high-class coal; and such results can in no wise be regarded as representative average ones. Moreover, high-class results have recently been presented which are quantitatively so uniform that it is perfectly clear they had a common origin.

An example of all this is found in a "special article"

contributed to the "Petroleum Times" on "Coal as the Source of our Future Oil Supplies." In the course of this communication, it is stated that about 15 cwt. of smokeless fuel would be obtained per ton of coal carbonized; and 20·9 gallons of oil would be realized. In Dr. Lander's paper, dealing with the work of the Fuel Research Board, extracts from which were published last week, he placed the quantity of fuel oil, as a fair average, at 13 gallons per ton of coal carbonized. In the article in our contemporary, it is also stated that 40 therms of high-grade gas would be secured, which would mean that, taking an output of 4000 c.ft. of gas per ton, this would have a calorific value of 1000 B.Th.U. per c.ft. But later in the same article it is suggested that the potential yield of benzole may be taken at 6 gallons per ton of coal; whereas Dr. Lander places the yield as an average at 2½ gallons. To take as an average 6 gallons per ton is, of course, excessive and wholly unwarranted. The writer of the article is anxious to show that, if (and this is an "if" which should be heavily emphasized) 80,000,000 tons of the 180 odd million tons of coal now used in this country were carbonized at low temperatures, sufficient motor spirit would be provided to meet the requirements, which our contemporary has estimated at 400,000,000 gallons per annum. The 80,000,000 tons of coal the writer thinks could be converted into smokeless fuel with great advantage to the country generally; and, without any attempt at differentiating between the characteristics of the coal, he places the potential yield of motor spirit at 6 gallons per ton compared with the 2½ gallons Dr. Lander gives as an average. Naturally, if one could positively secure an average of 6 gallons per ton from 80,000,000 tons of coal, a yield of 480,000,000 gallons of motor spirit would be available; but, as to this being a possibility likely to materialize, our expectations are not great. Dr. Lander in his paper adopted a more modest attitude. He suggested that if the 35,000,000 tons of coal now burned annually for domestic use were converted into smokeless fuel, the result would be (taking the average figure of 2½ gallons per ton) approximately 85,000,000 gallons of motor spirit, and 450,000,000 gallons of fuel oil. That spirit would fall far short of the estimate of the "Petroleum Times" as to the current demand in this country being in the neighbourhood of 400,000,000 gallons per annum. If we take the 80,000,000 tons of coal suggested by the writer of the article in our contemporary, and apply to it Dr. Lander's 2½ gallons of motor spirit per ton, we arrive at 200,000,000 gallons as the production per annum, which is only half the quantity of our estimated current consumption.

The 80,000,000 tons of coal, the 6 gallons of motor spirit per ton, the prospect of an output of 480,000,000 gallons from that coal, is all hyperbole invented by low-temperature advocates with richly endowed imaginations. Taking the varieties of coal constituting the 80,000,000 tons, they would not contain that quantity of realizable benzole. It is, of course, perfectly easy to secure a sufficient production of motor spirit on paper by taking large enough figures; and this is what the low-temperature advocates are doing. But it is not on paper that the production is required. It is wanted in liquid tangible form in storage tanks and cans. It is a great pity there should be this exaggeration, because it is not likely that the proclaimed results will be realized—at any rate within a span of time that will contain interest for any of us now discussing carbonizing problems and results.

A Plague from Prague.

CONSULTING engineers in this country tell us that they have had an application for advice from Prague on the subject of the system of carbonizing to be adopted for the new gas-works for the city which it is intended to construct to replace three obsolete works. The inquiries go beyond that, and into matters which should be the subjects of properly recompensed expert advice; and, as a matter of fact, we have said so in a letter sent in reply to a similar application addressed to the editor. Britishers are known abroad to be extraordinarily good-natured; but it should also be realized abroad that professional gas men cannot live on good deeds without proper quittance. One expert gas engineer who received inquiries referred to them as "cool impudence." Not even the fact that the circular-letter opens with such seductive words as "In view of your high reputation in "modern gas practice, we have the honour to turn your "benevolent attention on some problems which are of the "highest importance for the inhabitants of the municipality "of Prague," would soften his heart, and induce him to give without fee such advice as is sought from Prague. The fact that the letter has been sent to several professional quarters, shows that the authors are desirous to obtain as much advice as possible on *gratis* terms, then attempt to sift it for themselves, and select that which in their wisdom or ignorance they deem to be the best. This is, to our mind, extraordinarily bad policy. But we ought to say that the circular-letter appears to have emanated from a newspaper—the leading organ of the National Democratic Party—and not from the Municipality.

The latter, however, seem to have already received too much expert advice, and confessedly are now in a serious state of indecision. They have had advice as to carbonizing in continuous vertical retorts, low-temperature carbonization, and complete gasification. At one time they were disposed to enter into a contract for continuous vertical retorts; and then there came along some not over virtuous persons who informed them that the system was falling into disuse, and was everywhere being substituted by low-temperature carbonization and complete gasification. The low-temperature people wish this were true; so do those who contract for the installation of complete gasification plants. Nevertheless, both the low-temperature and complete gasification systems have been described to the Prague Municipality as "revolutions" in gas making. It is clear from this that what the Municipality want is a consulting gas engineer of eminence and high integrity to relieve them from the quandary into which their appetite for information has led them. By entrusting this matter to such an adviser, they would in the end save money, and secure years of satisfaction in respect of the gas supply. By following their present course of obtaining advice and plans from here, there, and everywhere, they are incurring the risk of a grave disaster.

Labour Saving in Annual Accounts.

THE accounts which are fast arriving regarding the working of gas companies for the past year have a striking resemblance in the tale they tell. The annual accounts of the Gas Light and Coke Company, the South Metropolitan Company, and the Commercial Company are much alike in their evidence of reduced costs for materials; of lower charges for, but reduced incomes from, gas, though business has increased, and more consumers and appliances have been connected; and of higher receipts for secondary products. The same evidence is found in the accounts of the suburban gas companies, and the similarity continues in those from provincial concerns. It is all very healthy. There are two suggestions we should like to make regarding information not supplied in some of the accounts. We are in the opening part of the therm era; and now would be a very appropriate time for those companies who do not give the corresponding figures for the previous year to incorporate them, so that comparisons can be readily effected by the stockholders. Some companies do this; and they save interested proprietors a lot of time, by enabling them to see exactly the trend of outgoings and incomes, the consumption of fuel in manufacture, makes and sales of gas, &c. But other companies do not afford the comparative data. Their chairmen say it is easy enough for the proprietors to turn up the previous year's accounts. It is not always so. It is not so as we write in one place this note, while the previous year's accounts happen to be snugly reposing in a desk elsewhere. It is highly interesting to hear the Chairmen of Boards of Directors who deny this convenience to stockholders dilate earnestly, sometimes eloquently, in their addresses at annual meetings on the labour-saving advantages of gas compared with other fuels. But they do not attempt to effect any saving of labour on the part of stockholders by affording them ready facilities for making comparisons. The economizing of time is not a monopoly of gas; and it might well be extended in the direction we have indicated—not only in connection with finance, but sales, seeing that the gas industry is now making its business developments under the auspices of the therm and against intensified competition. In these circumstances there is a new interest in the record of progress.

In this connection we would also suggest that the plan of the Gas Light and Coke Company should be adopted by other water-gas making companies of giving, as a footnote to the "gas made and sold" table, the quantity of water gas

produced during the year. It is impossible from the accounts of several companies as presented to ascertain how much of the gas made is coal gas and how much water gas. We have the amount of coal carbonized given, and the number of gallons of oil used. When we turn to the make and sale of gas, we find the coal gas and water gas lumped together in one figure; and therefore it is impossible to ascertain what, if any, improvements have been effected in manufacture per ton of coal. If the water gas manufactured is given as a footnote, it is then possible to see how much coal gas has been made from the total coal carbonized, and then per ton. Research, too, may be extended to ascertain how much oil has been used per unit of water-gas production. However, we should like to find these suggestions generally carried out in future accounts. The request for comparative figures has often been made by shareholders at meetings; but some feeble excuse is usually forthcoming for not complying with what others experience no inconvenience in doing. These shortcomings in the accounts are easily rectified where there is the will.

But we may end by hearty congratulation to three of the large suburban companies upon the expansion of their gas sales. Calculating on the therms sold, the Brentford Gas Company had an increase of 8·57 p.ct., or 1,821,347 therms; the South Suburban Company had an increase of 5·14 p.ct.; and the Tottenham Company 8·7 p.ct., or 1,080,867 therms. Yet some electrical men like to think that the gas business is crumbling to pieces. Their intelligence does not extend to the appreciation of our solid facts; they prefer unsubstantial fiction, simply because, strangely, it satisfies them more.

The Gas Light Increase of Business.

In the editorial comments on the speech of the Governor (Mr. D. Milne Watson) at the meeting of the Gas Light and Coke Company, an error escaped notice which should be rectified. It was stated that the Company's business in therms last year advanced by 5 p.ct., following an increase of 3 p.ct. in 1922. The "3 p.ct" should have been 8 p.ct. This makes a vast difference—a 5 p.ct. advance on top of an 8 p.ct. one in 1922. Taking the increases in the two years together, the quantity of gas represented by them would be equivalent to the total annual sale of many a large town in Great Britain. The therms sold in the year 1921 on the actual value per cubic foot amounted to 146,348,303 (declared value, 144,317,027); in the year 1923, on the actual value 167,686,298 therms (declared value, 167,059,775).

Advertise the Wembley Gas Exhibit.

A neatly-printed circular advertising the Gas Exhibit at the British Empire Exhibition at Wembley has been distributed with the annual report and accounts of the South Suburban Gas Company. This is a good way of commencing propaganda in connection with that coming event. Another way will be to send out circulars with the next accounts to the nearly 3¾ millions of ordinary gas consumers in Great Britain, and it may be expedient to take steps to let the 4¼ million prepayment consumers know something about the display. Combining the customers of non-statutory undertakings with those of statutory concerns, there are about 8 million gas consumers among whom to advertise. These represent a considerable section of what is termed the British Public.

Mond Gas for Gas Undertakings.

To-day we publish the concluding part of the review of the Gas Acts passed during the session of 1923. An interesting feature will be found in the reference to the South Staffordshire Mond Gas Act. The clause is reproduced which confers upon the Company the power to supply to gas undertakings Mond gas in bulk for mixing with coal gas; but the mixed gas is still to have the distinctive smell of coal gas. In fact, nothing in the Mond Gas Act is to relieve gas undertakings from any liability or obligation under any Act or Order relating to the supply of gas by them.

Engineers' Salaries.

A census has been taken by the Society of Technical Engineers of the salaries paid in the engineering profession; and, stated as averages, the result does not do justice to good employers, but shows that those employers are in a majority who inadequately value engineering services. The result is best shown in a tabulated statement.

Age.	Average of all Engineers.	Average of Assistants.	Age.	Average of all Engineers.	Average of Assistants.
	£	£		£	£
22 . .	150	150	38 . .	460	370
26 . .	240	220	40 . .	485	380
30 . .	325	285	44 . .	520	395
34 . .	400	340	50 . .	555	400

These are stated to be all qualified men, who have had a training as long and as expensive as that necessary for other professions; but their incomes are much lower. The maintenance of a suitable standard of living is declared to be impossible, and the incomes are insufficient to allow of the training of sons to enter the same profession. Perhaps it is as well for the sons, with such meagre average salaries as those quoted above. Yet our experience is that to-day there are more trained men available for engineering posts than there are positions for them. We are hoping that in time, with a revival of trade, this condition will be materially changed.

Heavy-Oil Engine Consumptions.

We have not seen the report of the Diesel Engine Users' Association for last year; but we learn from paragraphs published by our electrical contemporaries that important work was carried out by the General Committee during the year in connection with heavy-oil engine working costs. Taking a representative group of heavy oil engine installations, working with an annual plant load factor of at least 15 p.ct., and with outputs approaching 1 million KW.-hours per annum each, the average working cost was 1·086d. for 1921. If a suitable correction be made on the basis of present-day prices of labour and material, the figure, as at March, 1923, would have been 0·789d. per KW.-hour. The cost of fuel oil per KW.-hour generated in 1921 was 0·53d.; and therefore this had practically adjusted itself to the figure obtaining in 1917—viz., 0·52d.—before the occurrence of abnormal conditions consequent on the war. In 1921 the average fuel oil consumed per KW.-hour generated was 0·67 lb. We are not aware whether the report gives the calorific value of the fuel oil consumed; but, if not, we suggest that the data would be of interest and value for comparative purposes with other internal combustion engines.

The Forty-Eight Hour Week.

The General Council of the Trade Union Congress are taking advantage of the present political situation to urge that immediate steps should be taken by the Government to give legislative effect to the Washington Convention regarding the forty-eight hour week. A deputation from the Council have waited upon the Minister of Labour (Mr. Tom Shaw, M.P.), and have laid their views before him. He received them very sympathetically, as befits a Minister of the Crown. The whole matter, he states, is receiving his careful consideration; and he has made arrangements to submit it to the Cabinet at an early date.

"Transactions" of the Institution of Gas Engineers.

Containing about a hundred more pages than its immediate predecessor, the volume of "Transactions" of the Institution of Gas Engineers for 1922-23 is a very substantial compilation, the editing of which must have involved considerable labour on the part of Mr. Walter T. Dunn, F.C.I.S., the Secretary of the Institution. As a frontispiece there is a portrait of Mr. James D. Smith, who so ably presided over the annual general meeting held in Belfast during June, the report of the proceedings at which, of course, comprises the bulk of the contents of the volume. There is also an account of the special meeting in London last February, at which the Technical Education Scheme was adopted. This scheme, in its revised form, is given in full. A section of the book is usefully devoted to setting out the standard specifications for refractory materials for gas-works, drawn up by a Joint Committee formed of representatives of the Institution of Gas Engineers and of the Retort and Firebrick Section of the Society of British Gas Industries; and there are the customary helpful abstracts, by Mr. A. V. Hendrickson, of papers relating to gas manufacture published during the twelve months to June last. In the Memoirs are the names of some old friends still sadly missed—among them that of Mr. James W. Helps, who did so much for the Institution and the industry in general.

Southern Association of Gas Engineers and Managers (Western District).—There is to be a meeting of the Western District of the Association on Friday, March 7, at 2.30 p.m., in the offices of the Exeter Gas Company.

PERSONAL.

A bust of Prof. H. B. DIXON, F.R.S., was unveiled on the 1st inst., in the Chemical Theatre of Manchester University, to commemorate his great services to the University during the long period from 1886 to 1922. Many colleagues and past students attended the ceremony, which was performed by Dr. Harold G. Colman, who declared that Prof. Dixon's scientific work would constitute for him a more permanent memorial than the metal of the bust could secure. His brilliant research work had been inspired by the highest possible motive, that of the advancement of knowledge for its own sake; but, even so, it had conferred direct benefits on mankind. His work, perhaps more than any other, had gained knowledge of the mechanism of combustion, and had assisted in the development of the internal-combustion engine. Moreover, his study of gases had resulted in the considerable diminution of explosions in coal mines. Speaking as one of Prof. Dixon's early students, he expressed the gratitude felt by students for his teaching, influence, and help. His continued labours had resulted in the development of the Chemistry School; and while they congratulated him upon its efficiency and size, they also sympathized, for as the school grew, Prof. Dixon had been compelled to devote more and more time to questions of administration and less to teaching and research. They wished him many years in which to enjoy his leisure and to pursue research.

Mr. W. A. HOWIE, lately the Chief Assistant Engineer to the South Shields Gas Company, has been appointed Engineer and Manager of the Gravesend and Milton Gas Light Company, and has taken up his new position. He commenced his professional career as articled pupil to the late Mr. T. H. Duxbury, Engineer and General Manager of the South Shields Gas Company, and studied engineering subjects at the Rutherford College, Newcastle, gaining numerous first-class certificates. In 1909 he was awarded the first prize and silver medal in the Honours Gas Engineering Examination of the City and Guilds of London Institute. From 1914 to 1919 Mr. Howie served as an officer in the Royal Air Force. He has been identified with the reconstruction and modernization of both the South Shields and the Jarrow works of the Company, embracing horizontal, inclined, and vertical retort installations, carburetted water-gas plants, and other apparatus usually found in a modern gas-works.

Mr. J. P. LEATHER, F.C.S., who has recently retired from the position of Gas Engineer and Manager to the Burnley Corporation, was last Thursday evening, at a social gathering of gas employees, presented with an oak bureau and recording barometer, as a mark of the affection and esteem in which he has been held during his 35 years' service. Mr. and Mrs. Leather were also recipients of a silver tea service. Mr. J. H. Clegg, the new Engineer and Manager, presided, and the presentations were made by Messrs. W. Pedler and P. J. Hargreaves. Mr. Leather suitably responded, and addresses were delivered by Alderman H. Emmott, J.P. (Chairman), and Councillor W. F. Witham (Vice-Chairman of the Gas Committee), in appreciative terms of Mr. Leather's work for the Corporation. Mr. Clegg also spoke of the support he had received from Mr. Leather while deputy.

Last Thursday, the Blackburn Town Council accepted the resignation of Mr. J. E. HOLLIDAY, the Superintendent of the Greenbank Gas-Works.

CORNISH ASSOCIATION OF GAS MANAGERS.

At the Annual Meeting of the Cornish Association of Gas Managers, held at Truro on Wednesday last, Mr. F. R. G. Grant, Engineer and Manager to the St. Ives Corporation Gas Department, was elected President for 1924, to succeed Mr. W. Nicholls, of Penzance; and Mr. F. G. Kingwell, of Falmouth, was re-elected Hon. Secretary.

A vote of condolence was passed with the relatives of the late Mr. Thomas Settle, who was well known to most of the members present, having been for some time past engaged on important work in Cornwall.

Notice was given to alter the rules of the Association, with a view to increasing the membership.

Modern Gas Lighting.—This is the title of a booklet published by Messrs. Wm. Sugg & Co., Ltd., of Westminster, S.W. 1. It is an interesting résumé of lectures delivered by Mr. J. W. Lofts at Exeter, Bradford, Tottenham, Swansea, and Cardiff, and contains much information of value to all in any way connected with gas lighting.

Yorkshire Junior Gas Association.—There is to be a meeting of the Association next Saturday afternoon, at 3.15, in the gas showrooms, Darley Street, Bradford, at which Mr. Charles Roper (Secretary of the Joint Council of British Junior Gas Associations) will give a short account of the work of the Junior Gas Associations—special reference being made to the Education Scheme of the Institution of Gas Engineers. Members may bring forward proposals which would be of benefit to Junior Gas Associations generally. If time permits, a few short notes on "Reporting Escapes" will be given by the Hon. Secretary (Mr. F. A. C. Pykett).

ELECTRICITY SUPPLY MEMORANDA.

THE display at the British Empire Exhibition which is to be made by the Electrical Development Association has now been elevated by the "Electrical Review" as entitled to the descriptive term "Palace of Electricity." It looks and sounds well; and it makes us think of some of those eastern tales with which in boyhood we used to regale ourselves. However, it matters little what the exhibit is called; the chief thing is what it will be when finished, and the value it will produce in satisfying the objects for which it has been designed. Our contemporary published a picture of a model of the buildings in which the exhibits will be housed. It shows in the centre several stands and kiosks, and a part of an electric house or bungalow, which is to be the principal building. Ample gangway accommodation is being provided in the bungalow, in order to permit of large numbers of people passing through without congestion; and what will be demonstrated to them by the exhibits will be the practical applications of electricity to domestic service. At the opposite end of the site, there will be a bureau and rendezvous for the money-contributing supply undertakings, where competent attendants will afford those interested any information and accommodation that may be needed. In the central part of the structure, there will be eight large open stands, with raised kiosks at the four principal corners, in which various electrical operations will be carried out, against suitable backgrounds, and under powerful spot lighting. The "Review" states that the object of this feature is to produce a series of "living pictures," changing from time to time. In the open stands will be a range of domestic, small industrial, business, and special electrical appliances. The lighting of the section is to be carried out under the auspices, and with the help, of the Electric Lamp Manufacturers' Association. It is intended that it shall be in every way notable, and worthy of the importance of the occasion. Apparently, the applications are going to be numerically great in the section; inasmuch as our contemporary says: "The extensive cable and wiring system required to provide for the 'thousands' of different electrical applications in this section will be arranged for by the Cable Makers' Association, who will also make an interesting display of modern methods of wiring." The installation work is in the hands of the Electrical Contractors' Association; while the apparatus needed is being placed at the disposal of the Committee for the duration of the Exhibition by the members of the British Electrical and Allied Manufacturers' Association. In this there is co-operation in the saving of expense. A small space in the grounds has been taken to make a display of the uses of electricity on the farm and in agricultural work.

The "Palace" of Electricity.

The Water-Heating Problem.

The electrical heating of water has long been a problem with which the men of the electricity industry have tried to grapple; and it will continue to be a difficult matter for solution. To make the electrical heating of water by electricity popular, the cost of the heat energy will have to come down to an almost invisible fraction of a penny per unit; people will have to be able to obtain large quantities of water as and when required, without having to sustain heavy thermal losses through that long-hour heating-up method which the electricians advocate both for load and for installation reasons; the costs of installation will have to be considerably reduced; and so will the expense of the lagging, which is very essential to keep within bounds the dearly purchased heat, which is ever trying to escape from the water to the surrounding lower temperature air. All this shows that, though hot-water engineering is in any circumstances a ticklish job, requiring the utmost competence and technical niceties in installation, it is more than ever necessary that super-technical competence should rule when the heating agent is so expensive. Mr. C. G. Nobbs, of Messrs. George Nobbs, Ltd., recently read a paper on the subject at one of the salesmen conferences of the Electrical Development Association. It was a good paper in its way, because it told of the exacting care that must be taken in planning and installing; and of the need for cheaper heat electrically provided. But looked at from the electrical salesman's point of view, there was enough difficulty and obstacle presented in the paper to frighten him from recommending electrical water heating to the customers on his district, no matter how desirable such a load is to the supply undertaking. But there was value in the paper, in that it constitutes a warning that such work must be done in a manner which will give the maximum possible success; otherwise, anathema will freely flow from the consumers who have been deluded, and this would not do any good to the other business of the concern. These matters have to be looked at from more than one standpoint; and electrical salesmen know that inefficiency and uneconomy are not things that can be played with, there being already so much existing in other lines of their business—such as in room heating and cooker work.

The Views of Mr. Nobbs.

We can only take a cursory glance at the paper by Mr. Nobbs. In the first place, he said that the market for electrically heated water apparatus is still mostly confined to domestic supplies; but he finds there is a growing de-

mand for the larger type of plant for hotels, public institutions, and factories. That growing demand has not projected itself upon us to any alarming extent; but as a manufacturer Mr. Nobbs is naturally of opinion that the cost of electricity will largely influence the progress made in this direction. What the price will have to be, he does not say; but he does remark that, even when current can be obtained at ½d. per unit, the cost of water-heating by electricity is relatively high compared with the same service by coal. These words are significant. In his view, an indispensable condition to an electric water-heating equipment is that heaters of the immersion type should be used, so that the whole of the heat generated is given up to the water. He also regards it as essential that thermostatic control should be applied, in order to contribute to economy of heat, and therefore of cost. In his opinion, both the local storage and the geyser systems are but passing phases, brought about by the excessive price for current, and the consequent necessity to reduce electrically generated heat losses to their minimum. He believes that the central storage system which provides hot water "on tap" will be the more permanent one; but this will depend upon the reduction of the charges for current. Speaking generally, local storage heaters of low fixed wattage fail should more than one bath be required per day, or in the case of emergency. Again, if hot water is not taken when the storage tank is fully heated, the current goes on continuously until the water boils or reaches high temperature, when the heat losses equal the B.Th.U. input. So the consumer pays, grumbles, and spreads his dissatisfaction. The geyser is the antithesis of the storage pattern heater. The instantaneous water-heater has an extremely high efficiency, in that there are no stand-by losses; but it does not find a market very readily, because the majority of houses are not wired for the heavy current that is necessary to raise the temperature of a supply of cold water when drawn-off at the rate to which the public are accustomed. Another objection is that the electrical demands of these appliances constitute highly fluctuating loads. Geysers to be of any practical use should be loaded from 3 to 6 KW. for basins and sinks, and 9 to 12 KW. at least for baths; and then the load factor will be only 2 p.ct. Geysers of low wattage up to 2000 watts are comparatively useless for most average requirements. The future market of the electrical hot-water engineer, in the judgment of Mr. Nobbs, lies not only in the installation of new systems, but in the conversion of a large number of existing solid and gaseous fuel fired central storage systems, or as an auxiliary for summer working. He says the conversion may be effected by fitting new flanges to the existing cylinder or tank, and inserting immersion heaters and a thermostat directly therein. If anyone consents to conversion of this order with the immense amount of uneconomy and time inefficiency that would naturally arise, we predict that there would soon be reconversion, and memories of electrical operation of an abiding nature.

Things to Remember.

The author of the paper pointed out that in deciding the form and capacity of electrical heaters for existing installations, a careful survey should be made of the apparatus and the power required to offset the heat losses added to that for a stated draw-off demand. The survey will frequently disclose points where improvements such as lagging of the storage tanks and mains, re-grouping of pipe runs, and elimination of circulating pipes, &c., can be effected with a consequent reduction of current consumption. Mr. Nobbs is great on lagging. He appreciates the necessity for it, particularly in the case of electrical operation; and therefore he insists upon it. An unlagged hot-water tank would waste as much heat as is required to supply hot water for a family of five or six—possibly 3000 to 4000 units per annum. For the purposes of electrically heated tanks, he urges that cheap lagging should not be bought, nor should cheap water-heating apparatus, which is probably the hardest worked appliance in the house, yet has the minimum of attention. He points out, too, that tanks can be too light in structure. Again, with regard to thermal switches, he says that reliable ones, at a commercial price for domestic use, are still in the experimental stage, chiefly owing to the comparatively small demand. However, thermostatic control should be the general rule, and not the exception. The saving in current is mostly of the order of 50 p.ct., as compared with hand-switch control; and therefore the extra outlay is soon repaid. The usual practice is for the device to switch-on when the temperature of the water has fallen to 130° Fahr., and to switch-off at 150° Fahr.

Requirements and Costs.

The next part of the paper dealt with the important subjects of demand and costs. It is found by Mr. Nobbs that the average requirement for a British family of four to five persons is about 30 to 50 gallons of hot water daily, which shows that the four or five persons cannot all have baths ranging from 15 to 20 gallons each. However, he says the temperatures would range from 100° Fahr. for bath and lavatory basins, and 120° to 150° Fahr. for dishes, scalding, and charing. The demand fluctuates considerably. Sometimes even 100 gallons would be taken, and other days only 10 to 12 gallons, which shows the variable order of the business. Assuming the average demand is roughly 50 gallons of hot water daily, then the consumption of current would be about 3600 units per annum—that is, according to Mr. Nobbs, to whom we suggest that he has not in his calculation allowed sufficient for heat losses, assuming the inlet temperature of the 50 gallons averages 48° and the outlet temperature 110°. Granting, however, that 3600 units per annum is the consumption, Mr. Nobbs presented the listening salesmen with the following tabulated statement:

Price Per Unit.	Per Annum.	Per Month.	Per Week.
d.	£ s. d.	£ s. d.	s. d.
½ =	7 10 0 ..	0 12 6 ..	3 1½
¾ =	11 5 0 ..	0 18 9 ..	4 8¼
1 =	15 0 0 ..	1 5 0 ..	6 3
1¼ =	18 15 0 ..	1 11 3 ..	7 9½
1½ =	22 10 0 ..	1 17 6 ..	9 4½

In Mr. Nobbs' view, a 40 gallon lagged calorifier, with 1 KW. loading, controlled thermostatically, would easily take care of the above requirements; but, to be quite sure, he advises that a 2 KW. one should be adopted. Naturally Mr. Nobbs had something to say regarding gas-heated water appliances; but it was very little in amount, and poor in quality. We will not take the trouble to comment upon it, but leave the fast-growing popularity of the gas-heated types of appliances to speak for itself, which it does in resounding terms in the ears of electrical salesmen.

Miscellaneous Points.

Of course, we do not deny that there may be places where cost is no object, and where electrical water heating may be regarded as preferable to other systems; but such places are limited to almost negligible quantity in the great bulk of public requirement. By one speaker in the discussion it was acknowledged that there is not a sufficient demand for electric water-heating appliances to warrant supply authorities letting them on hire. We are not surprised at the confession. It was interesting to hear from one representative of the St. Marylebone Electric Supply Undertaking that, in his rich district, he has succeeded in getting 120 consumers to adopt water-heating appliances; but his total connection of them only equals about 583 KW. We should like to know something more about the statement of the Baths Superintendent at Poplar—that he is heating water electrically at 2·18d. per bath, is doing it successfully as a commercial proposition, and beating gas. The statement no doubt sounded well at the meeting; but, as published, it is somewhat barren of detail. Another speaker pointed to the fully appreciated anxiety of electrical people to get rid of gas geysers; but he admitted that he is afraid to recommend apparatus which will only give a limited supply, and that at long intervals, because, in his opinion, such apparatus would do the cause of heating water electrically more harm than good. The central storage system is the one which, in his experience, is proving most suitable, and is the only method which is satisfactory to the consumer and to the electricity undertaking. Yet another speaker pointed to the difficulties with which electrical undertakings are faced in respect of the cost of installation. Looking at the facts as presented by paper and discussion, it is perfectly clear that the electrical water-heating business has not gained much ground; and there are too many entanglements about for it to do so.

Light and Sight.

In the "Memoranda" in the "JOURNAL" for Jan. 30, reference was made to signs of belittlement on the part of some of our electrical friends of the effects of high intrinsic brilliancy lights upon the eyesight. Prof. Elihu Thomson's letter in the "Illuminating Engineer" appeared to suggest that the views of Mr. L. Gaster on the need for avoiding glare had somewhat relaxed; but perusal of the article in our contemporary which evoked the communication from Prof. Thomson does not in any way indicate any departure by Mr. Gaster from the views he has consistently expressed since the start of the illuminating engineering movement. He has always considered, and still considers, that the high intrinsic brilliancy of modern illuminants makes proper methods of shading essential, and that neglect of fundamental principles in lighting is conducive to fatigue, and liable to have a prejudicial effect on vision. The point which he emphasized in his article was the necessity for caution in forming conclusions. Of course, when one has a good case, it is only spoilt by alarmist statements unsupported by scientific evidence, which in the case considered in the article were applied to modern illuminants generally, both gas and electricity. It is admittedly absurd to argue that we ought to refuse the use of modern illuminants merely because they need to be employed with care—for instance, to discard incandescent gas mantles, and return to the flat-flame burner. The dissemination of alarmist views, Mr. Gaster holds, would tend to check progress in all illuminants. The line which he has taken is thus one which, he submits, should commend itself to those associated with progress in all illuminants. At the same time, it must be conceded that the lower the intrinsic brilliancy of a modern light, the less need is there for adopting auxiliary fittings to produce the modification essential for eye protection.

The Failures at Reigate.

Small failures of electric current, if frequent, are perhaps more tantalizing to the users than a single failure of somewhat long duration. Reigate, as we stated in the "Memoranda" for Jan. 23, has been subjected to repeated failures for some time now; and residents and traders have been protesting very vigorously. At a recent meeting of the

Town Council, Mr. Temple Newell, the Chairman of the Electricity Committee, had to occupy the rôle of apologist for the troubles with which the customers of the concern have been afflicted. Two new 340 KW. Diesel engines have been installed; and a regrettable thing is that some of the troubles are due to them. There have been complaints, too, as to noise and vibration; and there has been delay in the equipment of sub-stations and re-arrangement of the mains. Mr. Newell referred to the conditions that have caused the failures as exceptional; the breakdowns, too, were only of local character, except in one case, when there was a general failure in Redhill for about ten minutes. Some of the failures were due to the fact that the sub-stations and the distribution system were overloaded and unequal to the work they had to perform; and he is of opinion that, had the new system been installed, the failures would not have occurred. As to the two principal failures in Redhill, one unfortunately happened on Christmas Eve; and this was caused by some of the new switchgear in the new sub-station getting almost white hot. The second principal failure was occasioned by a piston of one of the new engines seizing—thus putting the engine out of commission. Reigate appears to have been very unfortunate; but perhaps the consumers will be comforted by the reported statement of one of the councillors—Mr. W. Barrett—that "breakdowns in electric stations are not peculiar to Redhill and Reigate."

COAL TAR DISTILLATION.*

It is stated that "the reception accorded to the second edition of this most useful book, a book which has been justly classified as indispensable, has induced the author to use it as the nucleus of a large exhaustive treatise which, though printed now in a larger size, comprises nearly double the number of pages, and is in effect a completely new treatise. The book has been brought thoroughly up-to-date, and must inevitably take its place, unrivalled, as the standard work of reference on the subject, completely superseding the earlier editions."

This volume, which is printed in large octavo, with wide margins to the printed pages, in the excellent style characteristic of the treatises on carbonization, &c., published in recent years by Messrs. Benn Brothers, strikes one, on scanning the pages, as most imposing, despite the inclusion of advertisements occupying a dozen pages. It comprises the following chapters:

I. and II., Coal; III., Coal Tar, with its composition, &c.; IV., Lay-Out of Tar Works; V., How Tar is received from Gas-Works; VI., VII., VIII., Plant used in the Distillation of Tar; IX., Distillation of Coal Tar; X., Plant for Recovering Carbolic and Cresylic Acids from Oils; XI., Recovery of Carbolic and Cresylic Acids; XII., Plant for the Recovery of Benzoles, Naphthas, &c.; XIII., Recovery of Benzoles and Naphthas; XIV., Rectification of Benzoles and Naphthas; XV., Plant for the Working-up of Pyridine from Pyridine Acid; XVI., The Recovery and Rectification of Pyridine Bases; XVII., Plant for the Manufacture of Crude Naphthalene and Anthracene; XVIII., Manufacture of Crude Naphthalene and Anthracene; XIX., Pitch, and Pitch Getting; XX., Creosote; XXI., Gas Stripping; XXII., Tar-Works Tests; Appendix.

Throughout the book copious quotations are given from important papers, references to which are usefully supplied as footnotes; while at the end of some of the chapters is to be found a valuable bibliography of the subject under discussion. There is much evidence to show that the author has read widely and toiled diligently to bring all possible light of the best kind to bear on the various headings; and readers will accordingly be grateful for the information thus conveyed. One feels, however, that there is sometimes an inclination to prolixity and diffuseness, and that it would greatly improve the value of the quotations if the matter were summarized, averaged, or judged, as the case may be. The same kind of criticism has been levelled at Lunge's well-known works, in which, in the struggle for completeness, an amazing amount of information, quotation, and patent specification is brought to the notice of the reader, often to his bewilderment in the lack of the proper guidance of the author. It must be admitted that properly to expurge and summarize in the various cases dealt with is a most difficult matter; and one is therefore tempted to adopt the easier and safer plan of giving a fairly full quotation. In the matter of measurements, however, a strong hand should deal with quoted figures which are by inspection found to claim an impossible degree of accuracy. Many of the tables quoted by the author are absurd in this respect.

The geology, classification, and constitution of coal are elaborately described in 54 pages. All the recent interesting researches and theories are collected with great pains; and for this every reader will no doubt feel indebted to the author, though some may be inclined to say: "Why expatiate so much on coal? It is coal tar we wish particularly to study."

In the chapter on "Coal Tar, its Composition, &c.," which has been read with special interest and care, there is a regrettable number of slips, grammatical errors, &c., showing that the final proofs were not corrected with the care necessary in a work like this. At the foot of page 61, for example, this meaningless sentence occurs: "This tar was submitted to distillation and the hydrocarbon C_{10} H_{20} boiling between 172° and 174° C. Pictet and Bouvier finishing at 300° C., when about one-half of it remained as pitch." Other instances: "A minute quantity . . . were present;" "high temperature tars . . . yields on distillation," &c. In some of the tables—*e.g.*, 10 and 11—the percentages by weight of the distillates of samples of tar do not add up to 100, and appear to be incorrectly calculated from the "gallons per ton." Further, "cwts. of pitch per ton of tar" are wrongly given as follows: 11·5 cwts. as 57·80 p.ct., 11·60 cwts. as 57 5 p.ct. The figures are evidently interchanged. These mistakes are not serious, but annoying to the careful reader. Referring to the composition of low-temperature tar, about which, by the way, there is not a great deal of information in the treatise, the author states: "Instead of most of the nitrogen occurring in the form of pyridine bases it appears in the form of aniline and its homologues." This is misleading, for there is no proof that aniline is to be found in appreciable quantity in any coal tar. One would not go so far as to deny the existence of aniline; it may be there in traces. It is a popular error to suppose that aniline is derived in quantity from coal tar; but the author is no doubt well aware of this.

With regard to the important subject of water or liquor in coal tar, very little useful information is supplied to the expectant reader. It is put forward that the absence of free carbon, or the reduction in its amount, lowers the water content. We do not think that this is the correct view. Tar from heavy charges in horizontal retorts or from vertical retorts contains comparatively little free carbon. These tars are not more easily separated from liquor than tars made from light charges in horizontal retorts; on the contrary. This is no doubt due to the great difference in the specific gravity of the respective tars, which actually operates in favour of the better separation of the heavier tar containing the high percentage of free carbon. A "northern tar" containing 11·5 p.ct. by weight of ammoniacal liquor is described in a footnote as "a very watery type of tar." Surely this is a rather unscientific description and one inclined to cast a reflection on "northern tars." To our knowledge they are no more watery than tars from other districts. The author would have been wiser if he had treated the water in ordinary coal tars as adventitious, varying in percentage according to fortuitous gas-works conditions, such as those of condensing, collecting, temperature, duration of storage, &c. The proper course would be to calculate and present the distillation figures either on the dry basis or on a basis of low water content, say 2 p.ct. The comparisons between tars of different sources would thus become more useful. A disquisition on the causes and avoidance of high water content in tar would have been of great practical value to the gas engineer.

In his description of coke-oven tars the author is not quite happy. He states: "Tars obtained from coke-ovens are usually viscid and sometimes more or less sticky. . . . The yield of coke-oven tar per ton of coal averages 9 gallons, and the distillates obtained from this kind of tar contain far more paraffin bodies than those from horizontal or inclined retort tars; in fact, coke-oven tar can be considered as a paraffinoid tar." We are of opinion that the yield of tar from coke-ovens is better than that from horizontals using the same coal. The reason for its being actually less throughout certain parts of the country is that coking coals are used for coke-ovens in preference to gas coals; the latter having the higher volatile content and giving the greater tar yield. Coke-oven tar contains less paraffins than vertical-retort tar, and very little more than horizontal tar.

One would have welcomed more information about water-gas tars though the tables of analysis of various samples are interesting. (Table 35 is headed, in error, "Water-Tar Gas.")

In reference to low-temperature tar the statement is made that "gas coal and cannel coal yield 10 p.ct. and 14 p.ct. of tar by weight respectively, while gas coals in tar-recovery producer systems yield 15 p.ct." Probably the author has not had wide experience in these matters. It can safely be asserted that good gas coals in the best low-temperature carbonizing systems yield 15 p.ct. of dry tar, while good cannels yield as much as 25 to 35 p.ct. On the other hand 15 p.ct. is too high an estimate for producer practice. Table 40, which gives analyses of tars from low-temperature distillations of (*a*) bituminous coal and (*b*) gas coal, and (*c*) tar from producer systems using gas coal, cannot be regaded as anything like representative. It is also ambiguous, if not misleading. Is there any distinction between "bituminous" coal and "gas" coal? In the first column, solid paraffin is shown as 00·4 p.ct., evidently intended for 0·4. Figures obtained by the writer are much higher than this; but, of course, much depends on the nature of the coal and the method of destructive distillation. The chapter contains a helpful résumé of the researches carried out in recent years by Fischer and Gluud, Jones and Wheeler, and other workers on vacuum and low-temperature tars.

Turning now to the chapters of prime importance to the practical tar distiller, commendable prominence is given to continuous distillation; the subject-matter being well up to date. The new method of distilling by means of molten lead is referred to, and Wikner's improved dehydrator briefly described. Beyond this there is little that is new.

There is nothing calling for special notice in the chapters on refining, which perhaps go at times into superfluous detail. The treatment of the subject of tar acids is hardly up to standard; some of the author's ideas being open to question. There is no

* "Coal Tar Distillation and Working-Up of Tar Products," by Arthur R. Warnes. Third edition, rewritten and greatly enlarged; pp. 511, with 152 figs. Published by Ernest Benn, Ltd., London, 1923. Price, 45s.

reference to the recovery of the waste heat of the carbon dioxide generators, though the practice is general, the heat being used for the evaporation of the weak soda.

The author gives it as his definite opinion that as sources of carbon dioxide neither boiler furnace gases nor effluent gases from ammonia plants can be recommended. This opinion is not shared by many in the profession. Continuous causticizing is not referred to, though Walmsley has published a description of his new plant in Glasgow.

The manufacture of naphthalene and anthracene is neither so fully nor so carefully described as one could wish or rightly expect. In describing the chemical properties of naphthalene, no reference is made to beta-naphthol, its most important derivative, nor is mention made of the outstanding chemical fact that monosubstituted derivatives of naphthalene exist in two isomeric forms, styled "alpha" and "beta." Among novel methods of tar refining, no mention is made of the "Feld" system, in which advantage is taken of the sensible heat of the foul gas leaving the carbonizing plant to condense and isolate fractionally in a systematic manner pitch and the principal tar fractions. The chapter on "Gas Stripping" is rather unsatisfactory. The subject is not treated concisely, and there is repetition and looseness of statement in the thirty pages devoted to this section. The author appears to consider that gas washing is best effected by breaking up the washing medium into "a very fine mist." He is certainly wrong in this opinion. A fine mist has not the "body" or momentum that is necessary in washing by centrifugal effect. High speed and rapid change of surface of drops of ordinary size are, in the writer's opinion, the chief desiderata.

The new "silica gel" system of gas stripping is described, but no comparison is made with activated charcoal, coal, &c.

One has to make the general complaint of the lack of information as to the special uses of the refined products of tar distillation, and regarding world's yields, markets, prices, possible yields if the use of raw coal were largely restricted, and such-like matters.

There is no doubt that the previous smaller edition was extremely useful, especially for foremen or juniors, as it provided a very good general idea of the practice and theory of tar distillation. That it was very popular is proved by the necessity for providing new editions. The present volume, however, is evidently intended to serve a different purpose. One is inclined to think the volume has been rendered unnecessarily unwieldy by the space devoted to the constitution of coal, the recovery of benzole from gas, and the reprinting of numerous specifications and official forms. The last-named are, by law, of necessity posted in a prominent position in all tar works.

Notwithstanding all these criticisms, reluctantly made, it is felt that the author deserves great credit for the immense pains he has taken in the treatment of a most difficult subject. The book should be in the library of all who are interested in the buying, selling, or refining of coal tar.

THE VICTAULIC SYSTEM OF FLEXIBLE PIPELINES.

A Demonstration of Leak-Proof Joints.

In a recent letter in our correspondence columns ("JOURNAL" for Dec. 5, 1923, p. 660) it was disclosed that the rubber mixtures which have proved so successful in the investigations of Mr. Walter Hole ("JOURNAL" for Nov. 21, 1923, p. 504) were of "Victualic" origin; and considerable interest was shown last week when the "Victaulic" system of jointing was demonstrated at the London Offices of the Victaulic Company, Ltd., No. 28, Victoria Street, S.W.

THE "VICTAULIC" JOINT.

Already the joint is widely used for compressed air; over three hundred collieries, we learn, are using it, and many installations for gas, oil, and water have been laid. The general simplicity of the joint is well illustrated in fig. 1. It differs in construction from other types in so far as it embodies the principle of the hydraulic U washer, the self-sealing properties of which have been long recognized. It consists of two metal "half-housings" bolted together and enclosing a leak-proof and flexible inner ring. The housing fits closely over the ring, and takes the whole of the stress due to pressure. There is no rupturing stress on the ring itself; increase of pressure tends only to compress it. The same ring remains leak-tight at zero pressure; it will maintain a vacuum of 28 in. of mercury, and will resist inflow of fluids from the outside of the pipe against high exterior pressures. The flexible composition of the ring is the result of prolonged investigation and experiment carried out with the object of securing the utmost durability. It is interesting in this connection to note that authoritative investigations into the question of the durability of rubber compositions has revealed the fact that material similar to that originally used for "Victaulic" joints is still giving perfect service on water and gas mains which have been in use in different areas for periods ranging from eighteen to upwards of forty years.

DOGMATISM *v.* FACTS.

It cannot be gainsaid that much unnecessary and unfounded prejudice exists against the use of rubber; and it is surmised that this tendency can be traced to the lack of knowledge of this material. Many, for example, believe that motor-tyres are made of rubber, and base their opinions on the effects of various solvents and different conditions on a composition of rubber which was intended to serve the definite purpose of withstanding physical abrasion, and not of remaining proof against the action of fluids —whether liquid or gaseous. Let us quote a paragraph from the article by Mr. Walter Hole, to which reference has already been made. He says: "The manager of one rubber firm assured the writer that a rubber ring would disappear in a week if immersed in gas-works liquor. Another said practically the same thing. A leading authority on gas distribution matters told the writer that he would not think of using rubber for such a purpose (viz., as a jointing material). Others spoke to the same effect. But the curious fact emerged that none of these gentlemen had even given it a practical test themselves, and, further, that they were not acquainted with anyone who had. They were not speaking from their own personal experience, or even from second-hand knowledge. Thus, while there was plenty of dogmatism, there was none of that practical acquaintance with the subject upon which alone dogmatism may be safely based. Persistent inquiry, however, elicited the fact that at least one large provincial gas undertaking had lines of pipes jointed with rubber rings, which had been down for many years, and had given, and were giving, complete satisfaction. A rubber ring, taken from one of these joints during some alterations, and which had been in use underground for approximately forty years, was sent to the writer. It still retains its resilience, and, except for having taken a permanent set of a more or less oval cross-section, appears to be little the worse for wear."

The limit of useful life of the "Victaulic" composition is not, of course, known. Meanwhile, it is worthy of remark that out of a large number of joints which have been fitted in various parts of the world since June, 1919, no complaint regarding durability has been made.

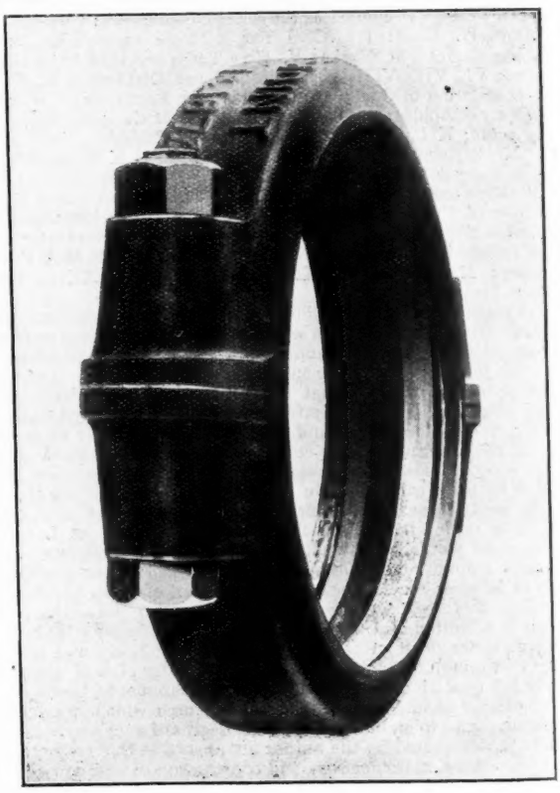


Fig. 1.—The "Victaulic" Joint.

ADVANTAGES OF THE "VICTAULIC" JOINT.

In practically all applications, the design used has annular recesses engaging, with a small amount of clearance, the shoulders on the pipe ends. This clearance allows the pipes to move together, apart, or to tilt within certain limits; yet the pipes are coupled positively directly the clearance is taken up. Among many advantages claimed for this type of joint may be mentioned the following: There is no caulking or skill required in fitting. The fitter simply puts the joint in place; he does not have to

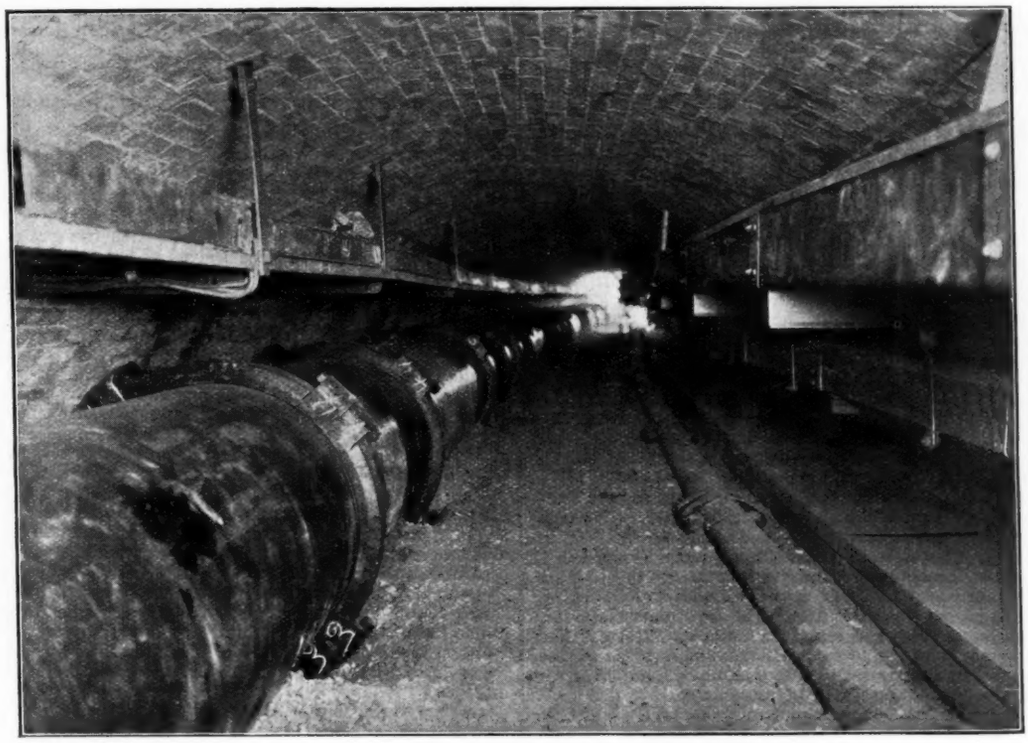


FIG. 2.—A "VICTAULIC" PIPELINE UNDERGROUND.

"make a joint," for directly it is in position, the pressure itself intensifies the seal. The joint can be fitted in any space into which a man can squeeze himself; and no tools, except a spanner, are required. It cannot be fitted wrongly, for the half-housings will not go together unless the ring is correctly placed. The joints couple the pipes as positively as flanges, and yet are flexible under pressure; and ground subsidence and vibration do not affect their leak-tightness. Moreover, the pipes can be laid rapidly, for, owing to the flexibility of the joints, exact alignment is unnecessary. The corollary to this, of course, is that they can be laid on undulating and uneven ground.

An Installation in a London Subway.

Subsequent to the demonstration, a visit was paid to a most interesting installation—a 36 in. "Victaulic" main, illustrated in fig. 2. Laid by the Metropolitan Water Board in a subway running from Tooley Street, London Bridge, to Westminster Bridge, it forms a balance pipe between two different water systems. When the tunnel was made—about forty or fifty years ago—a main of this magnitude was not contemplated; and space is accordingly restricted. Besides this, the line is laid on a curve. The flexibility of the joint allows for the latter; while it is possible, by slipping the partly erected housing round as the sections are added, to fit the joint when the pipe is accessible from one side only. The average time in fitting these joints was twenty minutes each; whereas, as is well known, the spigot and socket takes from 2½ to 3 hours. An added advantage of the system is the ease with which any pipe can be removed without disturbing the rest. The cast-iron pipes for this installation were supplied by the Stanton Iron Works Company, Ltd. The test pressure is 170 lbs. per sq. in., and the working pressure 90 lbs.

Recent Developments.

A recent development is a valve, complete with two "Victaulic" joints, into which the tube ends fit directly, without any taper pieces. In this ingenious design, instead of the characteristic shouldered ends, the valve has flanges indistinguishable from those of the ordinary type. Against these flanges are bolted "Victaulic" joints of a modified pattern; one side of the leak-proof ring making its joint on the outside of the pipe end in the customary way, the other sealing against the flange of the valve. Another interesting design is a short coupling piece which in reality is an extremely short bend covering 10°. This greatly increases the scope of the system where, for instance, a column has to be dodged, or an abrupt curve has to be followed where sometimes the length is not available for an ordinary bend.

Our third illustration, fig. 3, is a photograph of the 24-in. gas-main at the Provan Gas-Works of the Glasgow Corporation, in which a pressure of 30 in. of water is maintained.

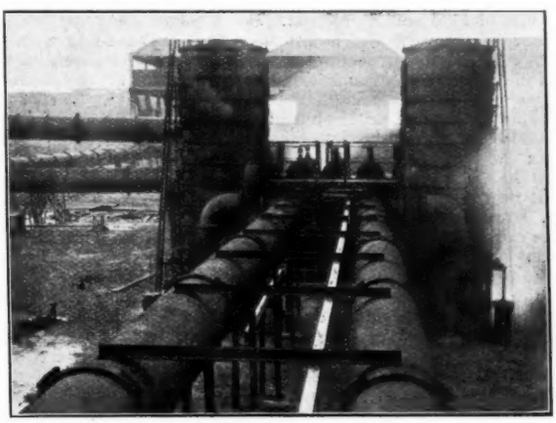


Fig. 3.—Gas-Main at Provan Gas-Works.

Water Circulation in Gasholders.

A method of heating and circulating water in the seal cups of gasholders, to prevent the freezing of the water due to complete exposure during severe weather, is described by Mr. C. A. Harrison, of Denver, in the "American Gas Journal." The plan outlined has, he says, proved quite successful from the standpoints of both efficiency and economy. It consists of the forced circulation of water through a heater; the water being then lifted and discharged through jets into the seals. The installation comprises a motor direct connected to a centrifugal pump, with an inlet feed from a water heater; the heater being supplied with water from the holder. The water is then drawn from the heater, raised by the pump, and forced from jets at five points in a circular direction into the seal cups, thus causing continuous movement. The excess water overflows from the cups to the tank on the inside of the holder. As the temperature of the water in the holder is slightly higher than the outside atmospheric temperature, and as the water is in continuous movement, it has not been found necessary to heat it except in the severest weather. This method has been successfully operated on a much lower cost basis than the system of heating by steam injected through jets into the cups of the holder.

Southern Association of Gas Engineers and Managers (Eastern District).—The next meeting of the Eastern District of the Association is arranged for 2.30 p.m. on Tuesday, the 19th inst., at the Institution of Gas Engineers, No. 28, Grosvenor Gardens, S.W.

The Illuminating Engineering Society.—A meeting of the Society will be held at the Royal Society of Arts, John Street, Adelphi, on Tuesday next (Feb. 19), at 8 o'clock, when a discussion on "Some Aspects of Railway Lighting" will be opened by Mr. J. F. Caine and Mr. E. A. Marx.

L'INDUSTRIE DU GAZ.*

I.—DISTILLATION DE LA HOUILLE.

(77 Illustrations, pp. 295.)

The first volume is confined to a study of the distillation of coal as accomplished in modern retort-house practice. It commences with a short historical outline of gas manufacture, and goes on to discuss present and possible developments of the gas industry. After briefly treating the coal resources of European countries and America, the classification, sampling, and testing of coal are barely mentioned—all notes on sampling and industrial analysis being condensed into two pages. The transport, handling, and storage of coal are treated in a general way.

The theory of the heating of recuperative settings and general problems in heating are well explained. Various types of producers are described—not, however, in great detail. The tar-fired retort-setting is here illustrated; and this is of interest, although it is a long time since tar fetched so low a price as to be comparable as a fuel with coke. The chapter on the theoretical considerations of carbonization is interesting and well written, and recounts at some length work on "steaming" carried out at East Greenwich by H.M. Fuel Research Board.

As regards details of retort plant and appurtenances, little information is presented, though considerable space is devoted to illustrations and descriptions of two English vertical retort systems—namely, the Woodall-Duckham and the Glover-West. This section would be greatly enhanced in value by the addition of practical information, with diagrams, about hydraulic mains, gas take-off pipes, tar towers, and general retort-house working.

The volume concludes with a good chapter on water gas and the various manufacturing systems. A résumé is given of the useful research work carried out on the Humphreys and Glasgow plant at Birmingham in 1921-22, under the auspices of the Institution of Gas Engineers. The chapter on coke ovens, and that on complete gasification, are of great interest, and bring the book right up to date. No mention is, however, made of the Tully system of complete gasification.

II.—TRAITEMENT DES PRODUITS ET SOUS-PRODUITS.

(115 illustrations, pp. 307.)

The second volume by the same authors deals with bye-products, and gives a fairly comprehensive survey of the purification of gas and the application and use of gas-works materials and residuals. The book is copiously illustrated.

Gas condensation is treated well; but the section on exhausters is rather brief, and what explanatory information is given could be greatly improved. Ammonia washing hardly receives the attention it deserves, and in this chapter the Kirkham ("Standard") centrifugal washer is illustrated and described, but is erroneously called the Feld. That part of the book describing the elimination of sulphuretted hydrogen and the chemical reactions involved therein is well written, and mention is made of the purification schemes of Feld and Burkheiser.

Benzole recovery and rectification are explained in a lucid manner in the fourth section of this volume. The part dealing with the working-up of ammoniacal liquors and with the production of sulphate of ammonia, is also fairly complete. Tar distillation, including the separation of the various fractions and the extraction of the more important constituents, is capably set forth; the various types of distilling plants being well illustrated.

To the long range of chemical tests to which gas is subjected in the best regulated works, comparatively few pages are devoted; and, strange to say, the important measurement of calorific value receives very scant treatment. It is disappointing to find so serious an omission in a book of this kind. The volume concludes with a résumé of the regulations regarding the sale of gas and the control of the sliding-scale of charges for gas in France, as issued by the Minister of the Interior (April, 1921).

Supplied to us in paper covers in small octavo, the two volumes under review do not at first sight look imposing. A nearer acquaintance, however, will ensure a better appreciation of the work, which certainly redounds great credit on the authors. Both printing and illustrations are exceedingly clear. We can heartily recommend the book to students of gas engineering. The subject of gas supply, be it noted, is not here specially dealt with.

The books contain advertisements of gas-works appliances.

* Par MM. René Masse et Auguste Baril. Encyclopédie Léauté, MM. Masson et Cie., Paris, 1923.

The Forthcoming Ideal Home Exhibition.—More comprehensive than ever is to be the "Daily Mail" Ideal Home Exhibition which will be opened at Olympia by H.R.H. the Duchess of York on Feb. 28. All available space in the two great halls, the annexe, and the galleries will be occupied with live demonstrations of how homes of every type can be improved both as regards beauty and utility. In the new hall will be a small town of fourteen full-sized houses and bungalows, furnished, decorated, and fully equipped. The main hall will be devoted to all that makes the home healthy, elegant, convenient, and easy to run from the housewife's point of view; while in the galleries will be all manner of labour-saving appliances and efficiency kitchens. The exhibition will remain open until March 22.

GAS ACTS FOR 1923.

(*Concluded from p.* 311.)

WE conclude to-day our review of the Acts, passed in the parliamentary session of 1923, in which reference is made to gas matters.

In the Act of the PLYMOUTH CORPORATION, there are four clauses referring to the Devonport gas undertaking, which the Corporation own. Sanction is given to the charging of differential prices according to the purpose for which the gas is supplied, provided no preferential price is given as between consumers who take a corresponding supply for the same purpose in similar circumstances. The Corporation have had removed from them the obligation to give a supply of gas for any purpose other than lighting or domestic use in any case where the capacity of the main is insufficient for the purpose, or if, and so long as, such supply would, in the opinion of the Corporation, interfere with the sufficiency of the gas required to be supplied by means of that main for lighting or domestic purposes. Another clause enacts that the occupier is to pay for reconnecting a discontinued supply; and, finally, there is a stand-by clause. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

The SOUTH STAFFORDSHIRE MOND GAS ACT has particular interest for gas undertakings in that the Gas Regulation Act has so enlarged the scope of gas undertakings that certain of them adjacent to the district of the Company are, as stated in the preamble of the Act, desirous that the latter should supply to them in bulk gas manufactured by them, which, it is believed, would enable the undertakings to afford supplies of gas to the public more cheaply than otherwise. The Company's Act of 1901 limited the supply and the use of their gas; and this Act amends those limitations. Apart from this, the Act deals with financial matters.

Turning to the clauses, it is proposed that the name of the Company shall now be the South Staffordshire Mond Gas Company, which is a shortening of the title by the omission of the words "Power and Heating." Then follows the clause referring to the matter which has just been mentioned—the supply of Mond gas to gas undertakings. The clause is as follows:

> Notwithstanding anything contained in the Act of 1901, the Company and any gas undertakers may enter into and carry into effect agreements for the supply by the Company to such gas undertakers of gas in bulk, upon such terms and conditions as may be agreed upon.
>
> Gas supplied by the Company to gas undertakers shall only be supplied by such undertakers to their consumers when so mixed with gas of such undertakers as that the gas supplied to such consumers shall have the distinctive smell of coal gas; and nothing in this section shall be deemed to relieve any gas undertakers from any liability or obligation under any Act or Order relating to the supply of gas, or to the gas supplied by such gas undertakers.
>
> Nothing in this Act shall be deemed to authorize the Company to break-up any street outside the district of the Company, or to authorize any gas undertakers to lay any mains or pipes, or break-up, or interfere with, any street beyond the limits of such undertakers for the supply of gas, or prejudice or affect any power, obligation, or liability with respect to breaking-up streets or executing works conferred or imposed upon the Company by the Act of 1901.
>
> The provisions of section 5 (General Objects and Powers of Company) of the Act of 1901, so far as they prohibit the supply of gas by the Company for the purpose of illumination or the use of such gas for such purpose, and the last proviso to section 46 (Obligation of Company to Supply Gas), and the provisions of section 48 (Gas not to be Supplied for Purposes of Illumination) of the Act of 1901 shall not apply to gas supplied by the Company to gas undertakers under the powers contained in this section, nor shall any such provisions apply to the supply of gas by such undertakers in accordance with the provisions of this Act, or to the use of any gas so supplied by such undertakers.

The Company are authorized to create and issue all or any part of the prior lien debenture stock which they are by the Act of 1907 authorized to create and issue; and any debenture stock so issued is to be, both as to principal and interest, a first charge on the undertaking. Power is given to issue any debenture stock so as to be redeemable on such terms and conditions as may be specified in a resolution passed at a special meeting convened for the purpose. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

The SWANAGE GAS AND ELECTRICITY ACT provides for the transfer to the Gas Company of the undertaking of the local Electric Company. The area of electricity supply is defined; and the Company are invested with all the necessary powers required for carrying on the undertaking. The gas limits are extended so as to include the parish of Studland; but if, after the expiration of five years, the Company have not laid mains for the supply of gas in the parish, the Local Authority or any company or person may apply for an Act or Special Order for the purpose of providing a supply, and for the repeal of the powers of the Swanage Company. Additional land authorization is conferred. It is enacted that for the supply of gas to any consumer outside the urban district of Swanage, a price may be charged which may exceed the price in Swanage by not more than 3d. per therm. There are a number of clauses of customary character. Protection is given to the Swanage District Council and the Dorset County Council in respect of mains and pipe work. As to the

extension of the gas lands, there is a protective clause in favour of Mr. Ernest Burt. This provides that the Company shall not erect any works for the manufacture or storage of gas or the generation of electricity on any part of the lands described in the second schedule to the Act within a defined distance; and the Company are, if required by the owner, to plant, to his reasonable satisfaction, a row of trees on or near to the southern boundary of the land. Power is given, with the consent of three-quarters of the votes of the shareholders present in person or by proxy at any general meeting, to create further capital as may be thought fit by the creation and issue of new ordinary or preference shares or stock. But the Company are not to create and issue any greater nominal amount of capital than shall be sufficient, after taking into account the premiums and discounts (if any) that may be obtained or allowed, to produce the sum of £40,000, except that, with the consent of the Electricity Commissioners, further capital may be created and issued for the purposes of the electricity undertaking. The Company are not to pay more than 8 p.ct. on capital issued as ordinary, unless a larger dividend be necessary to make up the deficiency of any previous dividend which shall have fallen short of 8 p.ct. per annum, or 7 p.ct. in respect of such capital as may be issued as preference. The auction clauses are included; but, notwithstanding, the Company may, with the consent of the Board of Trade, and subject to such special conditions as the Board may think fit to impose, offer for subscription by the public the whole or any part of the additional capital authorized by the Act. The Company may pay a commission not exceeding 5 p.ct. to any person in consideration of his subscribing, or agreeing to subscribe, whether absolutely or conditionally, for any such capital. As to borrowing powers, sanction is given to the borrowing of not exceeding in the whole one-half of the amount of the additional capital which has been created and issued. It is provided that separate accounts shall be kept of the gas and electricity undertakings, also that henceforth the Company shall be known as the Swanage Gas and Electricity Company. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

The last Act to be noticed is that of the TORQUAY CORPORATION, which is of an extensive composite order, and contains one part relating to their St. Mary Church gas undertaking. In the first place, a discounts clause appears, providing for a 10 p.ct. discount in consideration of prompt payment, and not exceeding 15 p.ct. rebate to large consumers. The other clauses are of ordinary character, until we come to two or three relating to the disposal of the revenue of the concern. It is provided that all moneys from time to time received by the Corporation in respect of the gas undertaking (including the interest on any reserve fund, when it amounts to the prescribed maximum) are to be carried to, and form part of, the borough fund, and all payments and expenses made and incurred in respect of that undertaking are to be paid out of the fund. Section 60 of the St. Mary Church Local Board Act of 1868, and so much of Article XI. of the Torquay Extension Order, 1900, as relates to the application of the revenue of the gas undertaking are repealed, provided that, notwithstanding anything in any Act or Order to the contrary, in the event of the sale by the Corporation of the undertaking, the net proceeds of the sale are to be applied to capital purposes (for which the Corporation are or shall be authorized to borrow money) for the benefit or improvement of that part of the borough which immediately before the passing of the Act comprised the parish of St. Mary Church. Then follows a clause which enacts that, whenever the total moneys from time to time received by the Corporation after the passing of the Act in respect of their gas undertaking exceed by more than £1000 the total of the amounts paid by them in respect of working and establishment expenses, cost of maintenance, interest and dividends, appropriations, instalments or redemption fund payments, other expenses of maintaining the undertaking, and the amount (if any) paid to the reserve fund, then the gas rents and charges to be made in the next succeeding year are to be, as nearly as possible, such that, at the end of the year, the excess shall not be more than £1000. [*Parliamentary Agents: Messrs. Torr, Durnford, & Co.*]

THE HISTORY AND DEVELOPMENT OF FUSED SILICA.

Its Use in the Gas Industry.

Fused silica is, by reason of its remarkable heat-resisting properties, a valuable material for the manufacture of chemical apparatus, and of late has been used extensively for gas-globes. For this reason, the paper on the history, development, and commercial uses of fused silica, read before the Royal Society of Arts on Jan. 30, by Sir Richard A. S. Paget, is of interest. The development of fused silica for commercial purposes is being largely carried out by the Thermal Syndicate, with which concern Lord Rayleigh is now associated; and the most important work since the war has been in the manufacture of translucent globes for incandescent gas-burners. These, though necessarily more costly than glass, have proved so very reliable that they are now widely used. In this case, as also in that of laboratory ware, the material is glazed on both sides by treatment after manufacture, as distinct from heavy chemical ware, which is simply blown into a mould, and has an external coating of unfused sand.

However, to give a brief statement of the history of silica, it need hardly be said that it is the commonest constituent of the earth's crust. It is estimated that, of the first ten miles depth, 60 p.ct. consists of this material—occurring as quartz rock, sandstone, and other forms of silica, either free or combined with metals or metallic compounds. The earliest experiments on the fusing of quartzite or silica appear to be due to Gaudin, in 1839, in which an oxy-hydrogen blowpipe was used. In 1879 Gautier exhibited small fused quartz tubes made with a blowpipe, and in 1888 Sir Charles Parsons—who, by the way, was present at the meeting on Jan. 30—communicated to the Royal Society a series of experiments, including that of fusing silica by means of an electrically-heated carbon rod embedded in sand; the fusion being carried out inside a closed cylinder and under a pressure of 5 to 30 tons per sq. in. This is believed to be the first instance in the history of silica fusion of the use of a carbon resistance rod, a method which has since become the standard. In 1898 Prof. Vernon Boys devised his beautiful method of drawing very fine quartz threads; and so the research work went on, year by year, until 1902, when the fusion of pure silica sand was undertaken on a larger scale. In 1902, in the United States, Elihu Thomson patented a method of forming articles of fused silica by a process similar to that of Sir Charles Parsons, but working at atmospheric pressure; and in this country R. H. Hutton, of Owen's College, Manchester, at the same time, independently developed a similar process. Hutton formed silica tubes either by passing a current through a carbon rod embedded in sand, or by supporting sand in a graphite trough having a graphite core fixed axially within it, and fusing the sand round the core by an electric arc arranged to travel longitudinally immediately above the trough. Both Elihu Thomson's and Hutton's methods produced the same material—viz., a fused silica of white, slightly translucent appearance—but suffered from the disadvantage that the size and shape of the fusion were limited to those of the melting core; and in these processes, as with some subsequent ones on the Continent, it was essential to keep the temperature as low as possible, in order to avoid the reaction of silica and carbon.

As the result of work by Lord Rayleigh in 1903, experiments were started at Wallsend, with the object of developing, if possible, a commercial method of fusion by means of some form of electric furnace. After numerous failures, an accidental result pointed the road to success; and it was found that by working at a much higher temperature than Thomson and Hutton, and by carefully regulating the heat, it was possible not merely to bring the whole fusion to a state of substantially uniform plasticity, but also so to regulate the interior gaseous pressure that the fusion remained separated from the core except at the relatively cool extremities. There was, under these conditions, no further reaction between the silica and the carbon, and the fusion could be blown up, *in situ*, into moulds surrounding the fusion, or the core could be withdrawn altogether from the fusion, and the latter removed from the furnace. The fused mass, in the form of a large tubular sausage, was found to retain its plasticity for a considerable time, and, in consequence, could be drawn into tubes, blown out into moulds, pressed, and rolled without reheating.

As to the heat resisting properties of this material, it is of interest to recall that, when the fire occurred at the Brussels Exhibition of 1910, the vitreous silica ware of the Thermal Syndicate was the only exhibit which withstood the fire which destroyed the British section. The paper then discussed the physical and mechanical properties of fused silica prepared in this manner, and mention was made of the fact that it is entirely unaffected by acids or mixtures of acids, except hydrofluoric and phosphoric. As regards its use for illuminating purposes, a demonstration was given. Among the exhibits was a stand to which was affixed a number of vitreosil gas-globes. During the reading of the lecture the mantles were lighted, and Sir Richard Paget, glancing at the gas lamps, jokingly remarked that he no longer required the electric reading lamp, and switched it off.

A short discussion followed the lecture, but no points were raised with reference to the use of fused silica products in the gas industry.

STEEL-BELT CONVEYORS.

An Efficient Handling System.

There are various types of conveyors; but among the simplest and most reliable is the band conveyor, which employs a continuous band, free from links, hinged joints, and wearing parts. The steel-belt conveyor manufactured by Steel Belt Conveyors, Ltd., of Birmingham, has a flexible linkless metal band capable of withstanding conditions and unloading methods that would quickly ruin a fabric or rubber belt. It has two terminal drums—*i.e.*, driver and idler—and intermediate supports for the upper and lower strands. The belt itself is cold-rolled, hardened, and tempered charcoal steel, practically free from sulphur and phosphorus, having a tensile strength of about 80 tons per sq. in. It can be supplied in one-piece lengths of 300 to 350 ft., and widths up to 24 ins. Consequent upon the hardness and dense texture of the steel, if a skin of rust were to form, it would not penetrate to sufficient depth to impair the strength of the belt. The nature of

the latter enables it to withstand close scraping by laminated steel scrapers; and this materially assists prevention of attack and corrosion. For wet ashes and clinker, &c., if the belt is kept close scraped while at work, and run round a few times before being stopped, so as to remove all clinging material, corrosion will be reduced to a minimum. Of course, it is difficult to give reliable information regarding its life without reference to actual conditions; in one case a life of twelve months might be good, while in another ten years might be short.

ROLLING AND SLIDING SYSTEMS.

There are two principal types of steel-belt conveyors—viz., rolling, in which the belt is supported on cast-iron roller idlers spaced at suitable intervals, according to the duty required, and sliding, in which the belt slides on timber runners having their faces planed smooth and graphited. This is cheaper than the rolling type, does not generally exceed 120 ft. in length, is offered for moderate duty and suitable materials, and is free from undulating motion. Frequently a combination of the two is employed with excellent results, and both are remarkably free from vibration. Belts can be operated at any speed from zero up to 400 to 450 ft. per minute, according to the nature of the material being carried; but in practice little advantage is gained by exceeding 200 to 250 ft. per minute for the rolling type, and 150 to 200 ft. per minute for the sliding type, and frequently even these speeds are unnecessary. Due to its transverse stiffness and ability to be loaded over its full width without the edges yielding downwards, steel belt has a "full" carrying capacity. The following figures refer to a belt 16 in. in width, operated at a velocity of 200 ft. per minute.

Material.	Lbs. per C.Ft.	Tons per Hour.	
		Open Belt.	Troughed Belt.
Coal	50	30 to 35	100 to 200
Granite (small) . .	150	90	Too abrasive for troughing.

For average material such as coal, stone, sand, &c., a safe incline for a smooth belt, which permits of unloading at any point throughout its length, is 1 in 4 (14°); but if delivery over the terminal only is required, small slabs of steel or leather can be fixed across the belt at intervals, and the incline increased to about 1 in 2½ (22°).

UNLOADING DEVICES.

Like all others, the steel-belt conveyor gives the maximum capacity and the best results if the material is loaded in the direction of travel of the belt. The unloading operation is interesting, as it avoids complicated trip or throw-off carriages. It embodies either delivery over the terminal or intermediate unloading by scraper ploughs. The general principle of a scraper plough is a number of steel blades, each about 6 in. long by 3¼ in. wide by 0·024 to 0·04 in. thick, secured to a bar or batten, each blade overlapping the next about ¾ in., so giving a laminated effect, and pressing edge downwards on the belt. These are arranged obliquely across the belt, so as to unload to one side, or V-shaped, so as to unload to both sides simultaneously. Several ploughs can be in operation at the same time, each unloading a portion of the total load; and provision is made for pressure to be maintained on the ploughs, to ensure close scraping.

EFFECT OF TEMPERATURE.

For ordinary conveying schemes in which the bulk of the load lies at the centre of the belt, tapering towards the edges, the belt is not unduly affected by material at temperatures up to 250° Fahr. Where the hot material is of such a nature that it can be spread over the full width, or if the belt is to be heated, the temperature can go up to 400° to 450° Fahr.

YORKSHIRE JUNIOR GAS ASSOCIATION.

An Interesting Day at Halifax.

An exceptionally interesting day was arranged for the benefit of the members of the Association on the occasion of their visit to Halifax, on Saturday, Jan. 26, to hear the Presidential Address of Mr. W. Heathcote, Sales Manager of the Halifax Corporation Gas Department.

MESSRS. GLEDHILL'S TIME RECORDER WORKS.

The day's proceedings opened as early as 10.30, when all who could get to Halifax by that time—and they were a substantial party—assembled at the Trinity Works, Harrison Road, of Messrs. G. H. Gledhill & Sons, Ltd., time recorder and cash till manufacturers, where the visitors were received and welcomed by Councillor Arthur Gledhill (Chairman and Managing-Director of the firm), who briefly explained the chief features to be noted, after which the members were conducted round. The visitors were greatly impressed by the large volume of production, and the evidence on all sides of facilities for meeting a world-wide demand for this important type of mechanical apparatus. Various kinds of cash registers were seen in the making, and particular interest was taken in the processes of manufacture of time recorders. The works are equipped with the latest plant. Messrs. Gledhill are specialists in mechanical appliances for aiding accurate factory records of production costs, and have in their own factory a costing system such as must be the envy of any business organizer who has the privilege of hearing it explained.

THE HALIFAX GAS UNDERTAKING.

The party later made their way to the Café Royal, King Edward Street, for lunch, after which, together with members who could not reach Halifax earlier, they proceeded to the offices of the Halifax Gas Department, where they were received by Mr. W. B. M'Lusky (the Engineer and General Manager) with the warm friendship for which Yorkshire Juniors know him of old; and under the guidance of Messrs. C. D. Cawthra, Howard Leach, and A. Plant, they were divided into parties and conducted over the extensive works. Mr. W. Heathcote (the President) took charge of the parties as they inspected the distribution and sales portions of the undertaking.

Particular attention was devoted to the reconstructed inclined retorts. Three settings are now heated from one producer; this system resulting in a substantial saving of fuel. Indeed, this reconstruction for firing by one furnace in place of three has probably saved the inclined plant from disuse. The coke loading and grading plant, installed twelve months ago, aroused interest. It is a composite plant, by various makers, assembled on the works, partly by gas-works labour. The bunkers were erected by Messrs. W. J. Jenkins & Co., of Retford. The Tully carburetted hydrogen plant also attracted attention. This has been working regularly for more than two years, and is proving very useful at the present time because of the shortage of coal. The boosters for sending the gas from the works to the holder at the storage station over a mile away were, like the storage station itself, constructed two years ago.

Another item of interest was the plant for the manufacture of concentrated ammoniacal liquor. The mechanics', carpenters', and blacksmiths' shops were visited, as well as the lamp, meter, and stove repairing shops, where all kinds of repairs are undertaken. The visitors saw the sandblast equipment for cleaning stoves, the re-tinning plant (in connection with which it was mentioned that a nickel bath will probably be added later), and the method of modernizing old-type cookers. In the meter repairing shop, where an average of 3000 meters a year are dealt with, there are facilities for the repair of all wet or dry meters, and also for their testing in accordance with the requirements of the Act. In addition to the existing 10 c.ft. test holders, by the Gas-Meter Company and Messrs. W. Sugg & Co., now used for the wet meters, the department have recently installed a new 11 c.ft. standard test holder by Messrs. Alder and Mackay. In the lamp shop it was explained that the department produce all their own street-lamps and burner clusters, including the mixing tubes and injectors. This has been found to result in considerable economy. A good deal of interest was taken by the visitors in the Woodall and Moon shocking machine for testing gas-mantles. A sample from every consignment received is carefully tested.

On the works the visitors were greatly interested in the Drake vertical retorts, erected in 1921, with a capacity of 1¾ million c.ft. per day, and described in a recent paper to the Association by Mr. Plant. In the course of this paper and the subsequent discussion, Mr. Plant had agreed that verticals in general give the best results if fed by a hard coal; and having this factor in mind, the visitors were the better able to appreciate the value of this Drake installation at Halifax when it was explained that, owing to the uncertainty of delivery of fresh-drawn coal, consequent on the railway trouble, the verticals were then being supplied with any mixture of coal from stock, and yet results had not been disturbed. There was no blowing or pulling. The inspection plugs at the top of the retorts, it was noted, could be lifted by the naked hand. The Drake verticals at Halifax comprise six settings of eight retorts, each carbonizing 2 tons 10 cwt. per 24-hour day.

The Halifax Gas Department are very proud of their works canteen and other facilities for the comfort and convenience of the men.

THE MEETING.

After a full inspection of the whole undertaking, the party assembled in the Board-room, where they were welcomed by Mr. M'Lusky, Councillor Stirk, O.B.E. (Vice-Chairman of the Gas Committee), and Councillors Gregory, Bates, and Skelton (members of the Committee). In view of the fact that the President was to deliver his address, the chair was occupied by Mr. R. N. WEBB, of Leeds (the senior Vice-President).

Councillor STIRK, in extending a welcome on behalf of the Gas Committee, apologized for the unavoidable absence of the Chairman (Alderman J. H. Waddington), who, as most of those present would know, was intensely interested in the welfare of the gas industry. It was hoped that the members would take away, as a result of the visit, something which would prove useful in furthering the progress of the industry. The Halifax Town Council felt proud of their gas undertaking, because they believed they had a works well worth inspecting. They were also proud of the Engineer and his staff. He believed from what he had seen and heard that the Halifax undertaking would compare favourably with any. Mr. M'Lusky was willing to help anybody who was out to improve methods in the industry, and he would be glad to give information desired on any point in connection with the plant.

Mr. C. ROPER (Bradford) proposing, and Mr. J. W. CARLTON (Shipley) seconding, a vote of thanks to Messrs. Gledhill & Sons, spoke in high praise of the firm's works.

Councillor BATES responded on behalf of Messrs. Gledhill & Sons,

and said he wished to echo Councillor Stirk's welcome, and to add his own tribute to the high esteem in which Mr. M'Lusky was held in Halifax. Indeed, the Corporation were highly appreciative of the whole staff in their successful efforts to make the gas undertaking one of the finest in the country.

Mr. J. B. BALMFORTH (Bingley) proposed the thanks of the Association to the Halifax Gas Committee and Mr. M'Lusky for their welcome and hospitality, and to the members of the staff who had acted as guides during the afternoon. The Association had had several visits to the Halifax undertaking, and they were always a pleasure. Halifax always seemed to have something new to show, and they owed a debt of gratitude to Mr. M'Lusky for his ever-ready help to the Juniors.

Mr. J. BRIDGE (Elland), seconding, said all in the gas profession in Yorkshire esteemed it a privilege and an honour to be associated in any way with Mr. M'Lusky, who was held in the highest esteem throughout the country. He was an Engineer who was blessed not only with knowledge and experience, but also with originality of ideas, as had been clearly indicated in his address to the Yorkshire Juniors last October, and his equally valuable paper presented a few days later to the Manchester Institution. Mr. M'Lusky had introduced to them the novel method of charging for gas which had been decided upon at Halifax, and which they all hoped would be a great success.

Councillor STIRK, replying, said the members of the Committee knew all that was said about Mr. M'Lusky was well merited. They appreciated his capable management and his genial presence, and were always interested in what he said when he spoke, because they knew that what he was saying was worth while.

Councillor GREGORY also responded, and said the Association were welcome to anything the Gas Committee could do to help them. At Halifax they hoped by new methods to introduce means of reducing the price to the consumer. Indeed, they had already done this. The best point about Mr. M'Lusky was that he never claimed all the credit to himself, but generously paid tribute to the loyalty and enthusiasm of his staff. Great credit was due, however, to Mr. M'Lusky himself for the happiness and contented working of the whole staff at Halifax.

Mr. W. HEATHCOTE (Halifax) then delivered the following

PRESIDENTIAL ADDRESS.

My remarks will be confined to topics intimately concerned with the distribution and sale of gas. In this branch of the service, the number and variety of problems to be faced are sufficient to excite the interest of everyone connected with it; and the duties of the distribution staff provide scope for the exercise of a great range of talents. At the extreme ends we have the "public service" staff—to find and retain the business—and the distribution engineer, who conceives the means of conveying and delivering the supply of gas at the lowest possible cost. Between these two extremes, we have the officers who fix appliances and maintain the service. No undertaking, however small, should be without a whole-time officer on distribution, and the qualifications of this officer should not be inferior to those of the best fitter employed by any gas undertaking.

This officer should be able to think in figures relating to the cost of carrying out certain operations with gas and other sources of energy, such as:

1.—The cost of raw coal for power at the pulley or flywheel of the engine.
2.—The corresponding cost of electric energy.
3.—The amount of fuel put into the boiler furnace relative to the energy available for the work.
4.—The net cost of gaseous fuel for the same work.
5.—Reliable data for the heat treatment of metals.
6.—The value of gas for intermittent use, industrial, commercial, domestic, &c.

GAS OUTPUT STATISTICS.

Statistics relating to the output of gas to-day compared with ten years ago, as to the number of consumers, number of appliances in use, &c., show increases which on the average are considered satisfactory; but when we ourselves realize the value of gas—when we are able to say that we know from our own knowledge and experience what gas will do—we shall have no difficulty in promoting its further sale. We may glance at a few figures, but only to show what little progress has been made.

1922.—Increase in the sale of gas in this country, 3500 million c.ft.
Increase in the number of consumers:

Prepayment	65,789
Ordinary	47,047
Total	112,836

Increase in the amount of gas used for public lighting, 1180 million c.ft.
Average consumption per consumer:

	1922. C.Ft.		1921. C.Ft.
Prepayment	18,908	..	19,720
Ordinary	41,399	..	40,643
Prepayment and ordinary	30,128	..	30,181

In considering the increase of 3500 million c.ft., we should, of course, take into account the great improvement and the higher efficiencies of modern burners and appliances. In Halifax we have proved that it pays the smallest householder in the borough to use not less than 1000 c.ft. of gas a week. You will, however, not sell this quantity of gas to these consumers if you charge as much for the total volume used by one consumer as you would collect from three or four others whose combined consumption equalled his own.

Page 158, Table XXVIII., of "The Gas Salesman's Diary and Handbook" shows the comparative cost of coal and gas for heating purposes—see Columns 1, 2, and 3 of the table following. Columns 4, 5, and 6 show what the cost of gas would be under a scientific scale of charges.

Column 4.—To arrive at the average price of 2s. 9d. per 1000 c.ft., or 7·3d. per therm, it is assumed that the fixed charge per week under the Halifax scheme of charges is 9d., and that the consumption per week is 1000 c.ft.

Column 5.—The average price of 2s. 6d. per 1000 c.ft., or 6·67d. per therm, is arrived at by still taking the fixed charge as 9d. per week, but assuming that the consumption per week is 1500 c.ft.

Column 6.—The average price of 2s. 4d. per 1000 c.ft. is arrived at by assuming the fixed charge per week is 9d., and the total gas consumption per week 2000 c.ft.

Relative Costs of Coal and Gas Fires.

Basis.	Coal 50s. per Ton.	Gas 9·6d. per Therm.	Halifax Scale of Charges.		
			Gas 7·3d. per Therm.	Gas 6·67d. per Therm.	Gas 6·2d. per Therm.
No. of Hours.	Coal Fire.	Gas-Fire.	Gas-Fire		
(1)	(2)	(3)	(4)	(5)	(6)
1	4·3d.	1·25d.	0·99d.	0·9d.	0·86d.
2	4·3d.	2·5d.	1·98d.	1·8d.	1·72d.
3	4·5d.	3·75d.	2·97d.	2·7d.	2·58d.
4	4·9d.	*5·0d.*	3·96d.	3·6d.	3·44d.
5	5·3d.	6·25d.	4·95d.	4·5d.	4·30d.
6	5·7d.	7·5d.	*5·94d.*	5·4d.	5·16d.
7	6·1d.	8·75d.	6·93d.	*6·3d.*	6·02d.
8	6·5d.	10·0d.	7·92d.	7·2d.	*6·88d.*

Column 3 shows that when a flat rate is charged for gas the gas-fire is cheaper for intermittent use.

Columns 4, 5, and 6 show how the consumer can make the cost of gas-fires as cheap as coal fires, by using the appliances for a greater number of hours, because the greater his total consumption the smaller is his average price per 1000 c.ft. or per therm.

The advantage of the two-part scheme of charges is apparent from the above particulars.

People were apt to use gas very sparingly for lighting purposes until the sellers of electrical energy suggested the value of more artificial light. At one time, one or two flat-flame burners were good enough, and but for the advent of electric lighting, the bulk of the small householders to-day would probably still be satisfied with a low-powered unit. For lighting purposes we have now the gasfilled electric lamp—the so-called "half-watt"—used in profusion, and this is the gas salesman's opportunity. The small inverted gas mantle provides a superior quality of light and an equal intensity at a lower cost than the lowest charges for electricity in operation to-day.

Half-Watt Lamp.

Candle Power.	Consumption of Energy per Candle.
50–150	average 1·07 watts.
200–300	,, 0·95 ,,
500–1500	,, 0·783 ,,

Total average consumption, 0·934 watt per candle.

The duty of these lamps is very little higher than that of the metallic filament electric lamp, but the range of candle power obtainable is greater, and the contrast in illumination is very marked. The general impression is that when this type of lamp is used there is a large saving in current.

The heating energy provided by the gas-mantle is ten times greater than the amount obtained with the use of the half-watt lamp; therefore when gas is used for lighting there is a tremendous saving in the amount of fuel required for heating purposes in houses, factories, workshops, offices, &c. It is common knowledge that many people who have had electric light installed in large buildings have had to supplement their heating facilities; and in addition to having to pay a higher price for their illuminating agent, are also faced with a larger fuel account for heating purposes. What have they got? "Just artificial lighting," but it is electricity.

VALUE OF GAS LIGHTING.

A small factory of (say) 100 ft. by 50 ft. by 10 ft. (cubic capacity 50,000 ft.) would require 333 sq. ft. of steam radiation to raise the temperature of the room from 30° to 55° Fahr., and this would be supplied by 83 lbs. of steam per hour, or 95,200 B.Th.U. of heat. If 20 225-c.p. gas-lamps, each consuming 9 c.ft. per hour, were used for lighting purposes, the calorific value of the gas used being 450 B.Th.U., we should have a total heat from combustion of 81,000 B.Th.U. If 25 200-c.p. half-watt electric lamps were used for lighting purposes, the hourly wattage would be 5000 by 0·934 = 4670 watts or 4·6 units. The heat developed by 4·6 units of electricity would be 15,640 B.Th.U. Thus the additional heat required would be as follows:

With gas lighting, 14,200 B.Th.U.
With electric lighting, 79,560 ,,

We must therefore drive home the immense advantages of gas, and we should emphasize the quality of the light produced, which is acknowledged by the highest authorities to be the least injurious of all artificial illumination to the eye.

Electrical undertakings have spent capital lavishly in providing

and distributing electrical energy for power purposes; and by selling this energy at such a low price the lighting consumers have had to carry the bulk of the burden of interest and sinking fund charges on the new capital, which in many cases is tending to make the price of electricity for lighting prohibitive. When the cost of electricity for lighting is 3d. per unit, and gas is 3s. 11d. per 1000 c.ft., the balance is even—but with the advantage in favour of gas, that the renewal of a mantle costs much less than of an electric lamp, both of which have approximately the same life.

The prospect of electricity being generated and distributed at a cost to compete seriously with gas is very remote. The electrical engineer is greatly handicapped by the tremendous thermal and energy transformation losses, and also by the load factor. The following table shows the heat losses in one of the most efficient plants in the country:

Average Losses in the Conversion of 1 Lb. of Coal into Electricity.

—	B.Th.U.	P.Ct.	B.Th.U.	P.Ct.
1.—B.Th.U. per lb. of coal supplied	14,150	100	—	—
2.—Loss in ashes	—	—	340	2·4
3.—Loss to stack	—	—	3,212	22·7
4.—Loss in boiler radiation and air leakage	—	—	1,131	8·0
5.—Returned by feed-water heater	441	3·1	—	—
6.—Returned by economizer	960	6·8	—	—
7.—Loss in pipe radiation	—	—	28	0·2
8.—Delivered to circulator	—	—	223	1·6
9.—Delivered to feed pump	—	—	203	1·4
10.—Loss in leakage in high-pressure drips	—	—	152	1·1
11.—Delivered to small auxiliaries	—	—	51	0·4
12.—Heating	—	—	31	0·2
13.—Loss in engine friction	—	—	111	0·8
14.—Electrical losses	—	—	36	0·3
15.—Engine radiation losses	—	—	28	0·2
16.—Rejected to condenser	—	—	8,524	60·1
17.—To house auxiliaries	—	—	29	0·2
	15,551	109·9	14,099	99·6
	14,099	99·6	—	—
Delivered to Bus Bar	1,452	10·3	—	—

Conductor and motor losses will further reduce this efficiency. No matter how much business is acquired, there will still be trouble with peak loads. It is impossible to expect that any additional demands will level this undesirable factor. Compare with the above the losses in gas manufacture, which amount to approximately 25 p.ct.

The competition for the lighting field is being watched by people who are not financially interested, and an extract from a recent technical publication may not be out of place here:

> Increased attention is being given by both gas and electricity suppliers to the problem of factory and other lighting, which should be to the good of the user. There has been a tendency for electrical people to say somewhat complacently that electricity has got the lighting, and drift back into the position which existed a few years ago generally as regards electricity—viz., to wait for the consumer to come. The gas people, too, in many respects seem to have adopted the attitude that they cannot compete with electricity for lighting, and this attitude has lulled the electric people still further into a feeling of security.
>
> But it so happens that both the gas and electricity industries now have their Commercial and Publicity Associations, two very powerful driving forces, whose job is to keep the industries awake to the possibilities; and it must be confessed that they are carrying out this task very assiduously. The result is that we have seen such a burst of activity on both sides that the electric people are being told to wake up and push lighting, and the gas people are being told that electricity is not so hard to beat in the lighting field after all.
>
> The effect is to induce greater liveliness in this direction. This is all to the good of the consumer, and at the same time is leading to development and improvements which might not otherwise come about. *Meanwhile the principles of good lighting still have to be emphasized to many factory owners.—Mechanical World.*

This last sentence is most important, if gas lighting is in use at present. Owners must be induced to improve the quality of the lighting, in order that the business may be retained. If electric lighting is at present in use, the gas people should take the opportunity of persuading the owners to have a section of the works lighted by means of modern and efficient gas-fittings, thus paving the way for a complete change over. The excellence of gas cooking is appreciated while the meal is in progress; the cosiness of a room heated by gas is noticed during the period of occupation; but the quality of the lighting is always observed, and therefore it should always be good. Is there any reason why gas lighting should be secondary to gas for cooking and heating purposes? Originally gas lighting was left to the tender mercy of the tradesman, who did not take into consideration even the elementary principles of illumination.

Artificial illumination should be carefully studied, and the science properly applied by competent people. Aimless selection and spacing of lighting units should never be permitted. It is a pity that, when so much time and energy are spent on scientific research by the gas engineer, in order to produce and deliver a cheap and efficient commodity, from the meter outlet forward, it should be left practically to anybody to utilize the commodity efficiently or wastefully for whatever purpose it may appeal. Full control to the point of combustion should be exercised by the gas undertakings. We must present as good a case for gas lighting as we have done for cooking and heating purposes.

QUALITIES OF GOOD GAS LIGHTING.

Low Cost.—This is evident, but it must not be the only advantage put forward in favour of gas, because on one occasion when a gas advocate was enlarging upon the value of gas for lighting purposes the main point put forward was *cheapness*. This closed the case for gas, because the proprietor of the large premises explained that, as only the most expensive things would suit his clients, he would have to use another form of energy for lighting. Had the following advantages also been put forward, perhaps the case for gas would have had a more favourable and successful hearing.

Purity of light.
Absence of harmful rays.
A sufficiency of light, with freedom from violent contrasts.
Perfect steadiness, with the angle of illumination in a downward direction, and out of the line of vision.
Effective diffusion, with the colour as near daylight as possible.
Reliability of the source of the illuminant.

Knowing that gas for lighting purposes has all the above advantages, how are we going to retain the lighting load and also get new business? Advertising alone will not be sufficient. There is but one remedy, and that is to make sure that only good and efficient mantles and burners are supplied to the consumer. To do this effectively we must enlist the help of those engaged in the gasfitting trade, dealers, &c. A good system of maintenance should also be put into practice, to ensure that the consumers' appliances and burners are kept in the most efficient state; this service should not stop at the meter outlet.

MAINTENANCE.

In Halifax we have realized the value of maintenance, and for years our consumers have had all their appliances and lighting burners cleaned and adjusted free. The value of good and efficient lighting burners has also been proved. The Gas Committee supply one approved incandescent burner free, which has resulted in a large demand for this class of burner. Consumers are now convinced that, if the gas lighting is not satisfactory in every respect, it is their lighting fittings that are at fault—not the quality of the gas supplied. Maintenance helps to retain and improve the lighting load.

THE COST OF FREE LIGHTING BURNERS.

The sum of 1d. per 1000 c.ft. on every million c.ft. sold would provide 33 consumers with one free burner. If the average consumption per consumer was 30,000 c.ft. per annum, every consumer could be provided with one free burner. A practical demonstration of this kind would oust all cheap and shoddy burners—the greatest bugbear to the lighting load.

PUBLIC LIGHTING.

The recent formation of the Association of Public Lighting Superintendents is a step in the right direction. The main object of this Association is to induce responsible authorities to engage only qualified persons to have charge of this business. In many cases the person in charge has not the slightest knowledge of the principles of artificial lighting. It is sufficient if the gas burner and mantle are placed in the lantern; no thought is given to the particular value of each burner as a lighting unit. A particular type of burner is often adopted as a standard, and this type of burner is used anywhere and everywhere. The superiority of gas for street lighting purposes is generally acknowledged, and a well-kept system of public lighting is an excellent advertisement. A poor display of street lighting is to the detriment of the gas undertaking.

The first principles to be observed in regard to public lighting should be:

1.—The effect produced.
2.—The cost of service.

In some cases, electricity has been adopted at considerable cost to the ratepayers. Why? Sometimes to foster the electricity undertaking, and sometimes because the public desire a change—something new and fashionable. The cost of the installation, running costs, and maintenance are never considered until it is too late. Public lighting is more important to-day than ever, on account of the increase in fast-moving traffic. In many towns the streets are narrow, and the traffic is so congested that much higher illumination is necessary. The responsible authorities should face this necessity; money would be well spent in providing much needed increased illumination.

Watch committees and other municipal authorities should specify their requirements, and the responsible officer should see to the proper spacing, position, height of units, and character of the lamps to be used. Sufficient illumination should be provided to light both the streets and side walks; a street well treated in this respect must have a much higher site value. It will therefore be recognized that it is to the advantage of municipalities to give careful consideration to the proper illumination of streets.

Powerful units should be employed in large open spaces and at junctions of roads, and should be placed high up, to avoid glare and be out of the line of vision, but so positioned that even illumination is given. For thoroughfares, "staggered" side lighting is superior to central lighting, because the light also reaches the

frontages of buildings—a consideration which is appreciated by the police force. Thoroughfares should be classified thus:

	Minimum Illumination in Foot Candles.
1.—Main road	0·5
2.—Relief main road and important streets	0·15
3.—Side road and residence streets.	0 05

The reduction from high-powered lamps to lower-powered lamps should be gradual; sudden plunging from a well-lighted street to a comparatively dark one is undesirable and dangerous.

It may be interesting to consider the value of the distribution of the light from a 500-watt gasfilled electric lamp:

Analysis of a Hemisphere Divided into Three Angle Zones of 60°, *Total* 180°.

1. Zone from directly under the lamp.	0° to 60°
2. " " " " "	60° to 120°
3. " " " " "	120° to 180°
1. 25 p.ct. of the total light given off.	
2. 59 " " " " " "	
3. 16 " " " " " "	
100 p.ct.	

From the above particulars, it will be observed that nearly 60 p.ct. of the total light is given off in the medium zone. If the lamps are hung in the regular manner, the only rays that are profitably used for direct illumination in the required plane are those given off between the angles of 0° to 60°; the medium zone rays are only effective for illuminating vertical surfaces. The rays given off between the angles of 120° and 180° are entirely in an upward direction, and serve no useful purpose. The analysis shows that 75 p.ct. of the total light given by a bare lamp is wasted; and, to direct the rays in a useful direction, reflectors are necessary.

Compare these results with those of the modern inverted gas burner and mantle, with which one gets excellent distribution in all directions below the horizontal.

1. 51·4 p.ct. of the total light given off.	
2. 42·8 " " " " " "	
3. 5·8 " " " " " "	
100 p.ct.	

From 0° to 90° we receive 75·3 p.ct. of the total light.

REFLECTORS.

The distribution is changed by varying the shapes and materials from which the reflectors are made. The variation in the shape of reflectors is limited, and reflection is best secured by convex dishing. This form of reflector gives a very effective distribution of the light to the greatest distance; the greatest variation is practically secured by a combination of reflector shape and of material that secures diffusion. Diffusion and reflection are not the same phenomenon. In diffusion the light, on leaving the surface, has no relation to the incident light; it has no simple well-defined wave front, but a complex multitude of small waves travelling in all directions and not uniting in one general wave. Reflection is where the greater volume of light is sent off at an angle equal to that of the incident light, and all in one direction. It has a simple well-defined front. Diffusion from the surface widens the distribution.

Efficiency of Reflectors.

Composition.	Efficiency. P.Ct.
1.—Polished aluminium	81
2.—White enamel	79
3.—Nickelled copper	68

COLOUR OF LIGHT.

The real value of light is the quality of its composition. Amber cast reflected light contains a large proportion of green and red rays. White light contains a large proportion of violet rays from the extreme end of the visible spectrum, and has a dazzling effect. An amber light is not so great in value as a white light, but it is better for distinguishing objects low down, because the human eye is more sensitive to the green part of the spectrum. Green is stimulating; violet is fatiguing.

The time is now opportune for a minimum standard intensity of illumination to be adopted; until we have this there will still be blunders in street lighting, also useless expenditure of ratepayers' money. Correct lighting and the science of illumination are recognized by the Government through the factory inspector; let us hope that official recognition will soon be given to the necessity for good street lighting.

INCREASING SALES.

The problem of increasing sales, which is of vital importance to-day, is the particular job of the sales section of the distribution department or the gas service department—but how are we to accomplish this increase? Are our present increases due to the additional demand from existing consumers, or are they due to the increase in the number of houses to be supplied?

The existing depression in trade generally calls for strenuous endeavour, if the total sale of gas is to be retained or increased. Can better methods be adopted? Must we not give consumers some inducement in the way of special rates? Would it not be good policy to interest the proprietors of large stores and furniture dealers in gas-appliances? We could arrange with the proprietors to show modern efficient appliances in position (on sale or return), and allow a commission on all transactions for which they were directly responsible.

Co-operation between gasfitters, plumbers, and the gas undertaking is desirable. I am afraid that the industry is responsible for the present resentment which is generally displayed by the plumber, which to some extent is due to the gas industry's trying to monopolize the sale of appliances. The plumber and gasfitter is a person to be reckoned with, because he could do a great deal of harm to the industry if so minded. There should be complete harmony between the two, if business is to be increased. In Halifax we have an agreement with the master fitters, and all work done is carried out to our specification, at an agreed scale of remuneration. The master fitter sends his customer with a card of introduction to the gas showrooms to choose the appliance required. If a selection is made, the appliance is invoiced to the master fitter at the cash selling price, less an agreed discount.

The position of the gas undertaking is very different from that of the ordinary trader. The capital of the gas undertaking is sunk largely underground, whereas the ordinary trader has a small capital, and if business in one particular district is poor, he can tap another area or town. The gas undertaking cannot do this; business must be developed to the utmost extent within a limited area.

APPLIANCES.

The demand for appliances to-day is due to:

1.—Need for labour saving.
2.—Advance work done by gas undertakings.
3.—" B.C.G.A." activities.

Gas appliances that were once considered luxuries are now considered necessities.

THE IMPORTANCE OF THE APPLIANCE.

We must do all in our power to create a demand for appliances. The public is the jury; but the housewife in domestic matters is the judge, and it is the housewife who must be reckoned with. The appearance, finish, and design of the gas-appliance must make a favourable impression, and the efficiency of these appliances be brought home. No matter how good the quality of the gas supplied, and how good the service, it is the appliance which helps to sell the product, and it is the attractiveness of the appliance which helps to invite its use. It is a mistake to purchase appliances on the basis of cost alone; efficiency and the consumers' needs should also be taken into consideration.

AGENTS IN THE SUCCESS OF A GAS UNDERTAKING.

A reputation for courtesy is an asset that is intangible. Every member of the gas department can be of service to the consumer, and thus help the business of the undertaking. It is by the words and actions of the staff that the consumer commends or condemns the undertaking. The general public may have short memories for good service, but their power of retention is long for what they consider neglect. Equal attention and considerate treatment should be given to all consumers.

The complaints department have special opportunities for furthering the welfare of the industry. Neglect of complaints will result in dissatisfaction and decreased consumption. We can only further our claims by giving satisfaction to our consumers, and efforts should be made to establish confidence in our product and service. If this is maintained, the result will be increased consumption.

GAS CHARGES.

Gas charges are an important factor; and now that costs are becoming more stabilized, the scale of charges should receive closer attention, with a view to making further reductions—which are always expected by the public. In the past, gas undertakings were satisfied if the income exceeded the expenditure by a certain percentage; no attention being given to the fairness of the charges to all consumers. Gas charges should be assessed in such a way as to proportion the cost among the various classes of consumer. The common method of charge to-day is the flat rate per therm or per 1000 c.ft., which is not a fair method; this will be agreed by all who have graphed the incidence of fixed charges.

Let us look for a moment at the cost of service for various classes of consumer:

Annual Consumption.	Cost per Therm.	Cost per 1000 C.Ft.
C.Ft.	d.	s. d.
7,500	22·2	8 4
12,500	13·3	5 0
17,500	11·1	4 2
20,000	8·8	3 4
25,000	6·6	2 6
37,500	4·4	1 8
50,000	3·3	1 3
75,000	2·2	0 10
150,000	1·1	0 5
250,000	0·5	0 2½

When a flat rate is charged for gas, the cost for the service as outlined above varies per 1000 c.ft. from 8s. 4d. to 2½d., and such a scale does not tend to the development of business. The cost of service is due to meter reading, collections, office expenses, maintenance of mains, services, and meters, and fixed charges; and these costs have all to be met, whether gas is used or not. The same costs are incurred whatever the consumption of gas

may be. If gas was sold at the gas-works, it would be quite fair to charge a flat rate per 1000 c.ft.; but when the undertaking delivers at any point, at any time, and in any quantity, it becomes a greater problem, and can only be solved in a scientific manner. A fixed charge relative to the size of the premises or demand is just; and if this is paid by each consumer, the gas used can be charged at practically cost price.

The discount system of charges on large volumes is unfair. Why should the proprietor of a large business get a portion of his gas at a lower rate than the proprietor of a small business? This small consumer may be using gas for all purposes, yet his maximum demand may be much smaller than that of the larger consumer who may be using gas only intermittently for certain purposes. Under this system, the smaller consumer would have to pay the maximum price for his gas. These remarks also apply to householders.

In Halifax we are introducing the system of proportionate fixed charges, with gas at a low rate per 1000 c.ft., as from the commencement of the next financial year. Our charges are scientific and fair to all classes of consumers, and we are sanguine of success.

SALESMEN'S CIRCLES.

The recent formation of Salesmen's Circles is a progressive step, and everyone will agree that a body of this character fills a gap in our organization. The interchange of ideas and experiences will be helpful to all engaged in the sales section of the business. The conference of salesmen at Birmingham—held after only one year from the inception of the circles—speaks well for the enthusiasm displayed, and the splendid address by Mr. F. W. Goodenough should inspire the members, and spur them to greater efforts in furthering the well-being of the industry.

A salesman to be successful should have tact, courtesy, knowledge, personality, sincerity, conciseness, and last, but not least, enthusiasm. Very few men have all these qualifications, but they should be cultivated. A general knowledge of the following is also necessary:

1.—The construction of different kinds of appliances.
2.—The capabilities and suitability of such appliances for consumer's requirements.
3.—The consumption of gas for any given operation.
4.—Running costs.
5.—The most efficient appliance for any given demand.
6.—An acquaintance with types of appliances used in competition, their advantages, disadvantages, efficiencies, running costs, &c.

It is the duty of the salesman to interest the consumer in appliances that will meet his requirements. For example, a visit may be made to the showroom by a prospective consumer, who requires power, steam, or hot water. The assistant would have no hesitation in recommending a gas-engine, but would only be able to give the consumer general details. An inquiry of this kind should be followed-up with a visit to the consumer's premises by a fully trained technical man, who would go thoroughly into the whole question, and prepare a scheme to suit the actual needs of the consumer. In Halifax we personally follow-up all inquiries, for a two-fold purpose:

1.—To ascertain whether the recommendation or selection of appliance will give satisfaction.
2.—In order to furnish an estimate of the complete cost of the installation.

The Junior Associations already have as members the bulk of the technical assistants, and these men are duly qualified by their experience to carry out all calls made upon them. As I have already stated, however, the formation of Salesmen's Circles is welcome because of the benefit to be derived, not only by the sales section, but by the whole of the gas industry. In my opinion, the Salesmen's Circles should embrace: (1) The showroom staff; (2) district inspectors; (3) collectors; (4) meter inspectors; (5) gasfitters; and (6) complaints inspectors. Junior Associations should embrace all junior technical men engaged in the manufacture or distribution of gas; the qualification for entry being the holding of the ordinary certificate of the Institution's Education Scheme.

SMOKE ABATEMENT.

This subject cannot be dealt with too often. Mr. L. W. Chubb estimates that the total quantity of coal consumed in this country in 1922 was approximately 187½ million tons, as follows:

Factories	80 million tons.
Private houses	40½ ,,
Coke ovens	20 ,,
Gas-works	18 ,,
Steamships and railways	29 ,,
Total	187½ ,,

Of the 40½ million tons taken by domestic users, 6 p.ct. escapes in the form of soot into the atmosphere—practically 2½ million tons. Industrial users are responsible for the discharge of ½ million tons of soot into the atmosphere, and therefore the total for domestic and industrial users is 3 million tons, equal to 16·6 p.ct. of the total quantity of coal used by the gas-works of this country. The thermal efficiency of a coal grate is seldom higher than 20 p.ct., and therefore there is an additional waste of 32 million tons of coal.

In London the smoke evil costs the ratepayers £17,000,000 every year (L. W. Chubb), so that, calculated on the same basis (£1 1s. per ton), the yearly cost to the country for coal wasted in domestic premises and houses is £196,000,000, which is spread over:

Costs for extra washing.
Damage to clothing and fabrics. } Through the influence of
Depreciation of property. } sulphurous acids.
Extra chimney sweeping.
Artificial lighting.

The chief cause of suspended impurities in the air is through the incomplete burning of bituminous coal. The deposit—containing tar, ash, and salts composed of sulphides and chlorides (the most injurious being sulphur from burning coal)—per annum per square mile in certain towns has been given as follows:

1915	..	Oldham	.. 960 tons
1922	..	Rochdale	.. 692 ,,
1922	..	Malvern	.. 69 ,,

Observations taken in London show that 70 p.ct. of the deposit is due to domestic fires, and 30 p.ct. to industrial users. The air is purest in towns between the hours of 12 a.m. and 5 a.m. From 5 a.m. to 10 a.m. the impurities increase, the maximum amount of impurities being present at 10 a.m. From 10 a.m. the impurities gradually decrease, but at 5 p.m. there is an increase, after which time they again gradually decrease. Aviators have proved that few industrial towns are visible more than a few hundred feet above their chimneys. Apart from the high death-rate due to smoke pollution, Sir G. Newman estimates that 270,000 years of working time are lost every year through sickness due chiefly to the corruption of the lungs and skin of the people by coal smoke.

In New York, since the operation of the anti-smoke law, the tuberculosis mortality rate has been reduced by 50 p.ct. The Ministry of Health figures for 1922 show that the death-rate from tuberculosis in this country amounted to 855 per million people. Records from 116 towns indicate that influenza, tuberculosis, bronchitis, catarrh, cold, pneumonia, and other diseases of the respiratory system account for nearly one-third of the total number of cases treated, most of which could be traced to unsuitable atmospheric conditions.

Leonard E. Hill says that deaths from cancer in Manchester have doubled in 30 years. The total deaths in this country from this cause are as follows:

1900	829 per million
1912	1023 ,,
1921	1215 ,,

It is known that cancer can easily be produced experimentally by irritation with coal tar and soot, and therefore it is likely that smoke pollution is one of the causes which leads to an increase in this malady.

Pneumonia increases with the density of atmospheric smoke, and in some towns it has assumed a very acute and fatal form. Smoke lessens the sunlight and increases the humidity during both warm and cold weather. As fogs and moisture tend to increase the poisonous contents of the air, it is evident that smoke must exert an important influence on human health, and therefore the question of smoke abatement should be regarded as a problem of great concern by any community who would conserve the vital efficiency of its citizenship.

A glance at the sick benefits of the Friendly Societies and Trade Unions on the books of the Health Insurance Fund shows an alarming increase in sickness, judging by the amounts paid out in benefits:

	Sickness Benefit.		Disablement Benefit.	
	Men.	Women.	Men.	Women.
	£	£	£	£
1920	3,638,830	1,686,117	1,114,900	634,279
1921	4,810,470	2,271,662	1,669,985	981,748
1922	5,707,000	2,488,927	2,115,755	1,162,923

Smoke pollution is the greatest impediment to the highest development of civic beauty and refinement; it defaces, disfigures, and devastates buildings, restricts the style of architecture, and destroys the expression of building science, so that the edifices are reduced to a mass of begrimed masonry. The verdict of hygiene in condemnation of coal smoke is: "Of all the enemies of national, racial, and social health, there is none which receives so little attention in proportion to its importance."

A few weeks ago I read in a daily paper that a titled manufacturer likes to see smoke curling up in tall columns from factory chimneys, mixing with the clouds, providing light and shade, and other wonderful effects. Evidently this pleases the gentleman's artistic sense. This is of secondary importance; primarily he has the welfare of the people at heart. The smoke indicates that there is plenty of employment, full wages, happy homes, wives and children well fed and well clothed, and all receiving their full share of the joys of life. This is a laudable statement, and we all hope that the conditions may long continue; but they can still have factories working full time without the chimneys belching forth their foul products. I wonder if the gentleman who was responsible for this statement has his home in the centre of a manufacturing district. I am afraid not; it will be enough for him to spend a few hours daily in directing the undertaking which earns his dividends. Very likely his residence is far away in God's own country, where there is no evidence of man's polluting hand. The town as a dwelling place is left for the poor people who have not the means to take the tram, train, or car at the end of their day's toil to the suburbs, to dwell under purer conditions.

In this direction there is a vast field for the gas industry to use all its efforts to conquer the evil by creating and increasing the demand for gas-appliances for all purposes. The gas undertakings should have the support of all who are responsible for the care of the people's health, and the claims of smokeless fuels should also be furthered by the designers of buildings. The rank and file of the people, if they have the welfare of their own kith and kin at heart, should use every endeavour to conserve their health, and also to reduce the labour of their women folk.

THE EDUCATION SCHEME.

It is a matter for congratulation that the Institution of Gas Engineers have so thoroughly set out a proper scheme for the education of students who aspire to become responsible officials. The results that will accrue will be of great advantage to the industry generally. But facilities given in the past have been very poor in comparison with those afforded by other industries, and future expansion will call for greater efforts. It is to be hoped that all undertakings will realize their responsibilities, and that, in order to "keep the flag flying," they will give every encouragement to the employees who are desirous of bettering their positions, and that adequate remuneration will be given to these employees when they become thoroughly competent in that particular branch of the service. Poor salaries will never attract good material, and no salary is too big, providing that the recipient is giving an adequate return. When a man has demonstrated his loyalty and worth, it is the duty of those responsible to find the means to compensate him.

ELECTROLYSIS.

Our distribution systems are being attacked by a very dangerous element, the activities of which are increasing, owing to the augmentation of the field of electric energy. There are many factors which influence leakage of electric current when leaving our mains and services to return electric conductors. The Board of Trade Regulations framed for safeguarding gas-mains, &c., are not nearly stringent enough; it is high time that representations were made to the authorities to revise these regulations and to enforce severe penalties for the disregard of these injunctions.

Damage by electrolytic action takes place without anyone being aware of it until the walls of the pipes, &c., have been perforated. We had a recent experience in which a high-pressure main (covered with about 12 in. of concrete to carry the road traffic) had been subjected to this influence, and on locating the escape it was found that in a short section of about 12 ft. three perforations had been made—one fully half-an-inch in diameter—and that at least a dozen other places were badly pitted. A test revealed that a current of 10 amperes at 3 volts was passing between our main and the tram rails.

Another experience was the destruction of the cases of three meters, each meter being installed in different premises situated within a small area. No electricity was used in any of these premises, but we found that the service pipes supplying the buildings were the conductors of the electric energy to the meters, and that they were earthed by contact with walls slightly damp. The current density was very low, being 2 amperes at 1·5 volts, but quite sufficient to perforate the cases of the meters in a short time, which might have had unpleasant results had the defects not been speedily detected and remedied.

These electrical faults were within the range allowed by the present Board of Trade regulations. We have had many cases of this kind, and of damage by electric fusion; and we have also had many anxious periods due to escapes in very difficult positions.

CONCLUSION.

In the desirable qualifications of a successful salesman I referred to enthusiasm. In my opinion every one connected with the gas industry should be an enthusiast at his job. In our industry, which is endeavouring to make known and adopt means to achieve further success, there are unfortunately those who, through apathy, are stumbling blocks to its attainment. No association or organization is exempt from such members, who are a menace and source of weakness to us. These passengers in our midst are often the cause of many of our set-backs. In many directions keen members are discouraged by the lack of enthusiasm shown, but they should remember that all great victories have been won in the face of great obstacles.

Our old aims, and the issues we strove for then, were worthy; but what of the future? However great it may become, it cannot be brought about without great effort to-day. The man who understands will invest our claims with a new character, and will find them of great value. It is necessary for us to have a firm belief and unshaken adherence to our cause, and to build strongly for the time to come.

YOUR JOB.

Your job is the best job you ever had. It commenced where all its predecessors, "whatever their compensation," left off, and is thus nearer to-morrow than they. Your job is the path which leads, through the morass of routine mediocrity, up the sanded slopes to the sunlit peaks of success. To carry you further requires the fire of ambition and the light of steadfast ideas. It is your life during the greater number of your waking hours. Dare you hold it lightly? Can you at once be false to the work and true to self? Your job will serve you well in return for your respect and honest devotion. Ask of it what you will, it will provide food and shelter, it will give a fireside for your dear ones, it will instruct you and educate your children, it will give you the fellowship of good books, and eventually offer you in mellow years the leisure for the enjoyment of travel, art, music—dreams.

Your job—when the time comes for passing on—will have chiselled your record on the monument of time; and other men judge you to-day, to-morrow, and hereafter by that inscription.

The CHAIRMAN said they had listened to what to his mind was an exceptionally well-conceived and well-delivered address by their President, who must have been to a great deal of trouble to put together such a mass of valuable information and guidance. Mr. Heathcote seemed to have touched on nearly every point connected with the distribution of gas; and if all gas manufacturers were working side by side with a man of such high ideals, the industry was very well off indeed. With men of responsibility so keenly enthusiastic as was their President, he was convinced that the day when the gas industry would be a dying one was a very long way off. His own opinion was that the industry had a tremendous future.

Mr. E. J. SUTCLIFFE (Deputy Gas Engineer, Bradford), proposed a vote of thanks to Mr. Heathcote, which Mr. J. M'LUSKY (Calverley) seconded.

Gas-Boiler in a Thread Mill.

The important work which a Bryant automatic low-pressure gas-fired boiler is performing in a large thread mill at Boston is detailed in a contribution to the "American Gas Journal" for Jan. 19, from the Industrial Gas Class of the Massachusetts Institute of Technology. The writer is Mr. E. W. Berchtold, Sales Engineer to the Boston Consolidated Gas Company, who says that the boiler turns a soft fibre thread into a smooth silky finished thread at the rate of 70 miles per minute. The boiler is equipped with automatic water feed, and occupies an approximate floor space of 70 in. by 30 in. It supplies steam heat for a finishing room 99 ft. long 17 ft. wide, and 13 ft. high, in which a temperature of 105° Fahr. is maintained day and night. There are nine hundred finishing machines, and under each one are eighteen rows of 1-in. pipe, 3 ft. 10 in. long, with a 3-in. header at each end. The length of the headers is 5 ft. each. The Bryant boiler supplies steam to these coils at 3 lbs. pressure; the last coil being 130 ft. from the boiler, which is covered with 85 p.ct. magnesia 2 in. thick. All the piping that is not used for heating is covered with standard pipe covering. In addition, four barrels of size are "cooked" each day; this being accomplished with a ¼-in. open-end steam pipe jetted into the paste barrel. It is for this reason that the automatic water feed is attached to the boiler; there being a loss of water by using the steam jet. The boiler requires very little attention, and is in operation day and night without watching. By means of the automatic fuel control governor, it maintains its own constant steam pressure at all times. This governor shuts off the gas when the steam pressure reaches 3½ lbs., and turns it on when it has dropped to 3 lbs. With this and the automatic feed, there are secured speedy production, uniform quality, and perfect finish.

Dr. Lander on the Work of the Fuel Research Board.—In last week's issue of the "JOURNAL," some extracts were given from the paper which Dr. C. H. Lander read before the Midland Institute of Mining Engineers, on the work of the Fuel Research Board. We omitted to state, through want of knowledge that this was the rule, that the copyright of the paper (as of all papers read at their meetings) is vested in the Institution of Mining Engineers, of Cleveland House, 225, City Road, London, E.C. 1.

Institution of Heating and Ventilating Engineers.—The annual meeting of the Institution was held last Monday at the Holborn Restaurant, W.C., when Mr. P. M. B. Grenville was made President for the year. In his address, he suggested that the younger members should be included in the Council and on Committees. Other suggestions for the future were the formation of provincial branches, and the institution of a bureau of information by a few experienced members, to stimulate greater interest. He referred to the work of the Research Committee, which had marked considerable progress, in providing reliable data; and he appealed for further generosity, to ensure that the investigations should continue without intermission. Sir George Croydon Marks, M.P., at a later stage delivered an address.

Benzole Production in India.—The January issue of the "Indian Importer and Exporter" gives an account of a demonstration of the working of the first benzole-recovery plant in India. This plant has been installed as an addition to the coke and ammonium-sulphate plant of the Bararee Coke Company in the Jherria coalfield. The coke plant consists of a battery of 35 Simon-Carvés waste-heat ovens which are producing a high-grade coke for the local blast furnaces. A rectification plant capable of producing pure benzole, toluole, and solvent naphtha will shortly come into operation. The rectification process is very complete, and a high degree of purity will be obtained. It is intended to market the rectified benzole as motor spirit, and it is confidently anticipated that it will be as popular in India as it is in England. In this connection it is pointed out that benzole has many advantages over petrol—such, for example, as greater mileage per gallon, better hill-climbing powers, and easier running.

LONDON AND SOUTHERN JUNIORS AT FULHAM.

The President's Day.

There was striking testimony last Saturday to the popularity of the Gas Light and Coke Company, the London and Southern District Junior Gas Association, and their President, Mr. Walter Grogono. This date in the session's programme had been selected for a visit to the Fulham Works of the Gas Light and Coke Company, of which Mr. Grogono is Assistant Engineer, and the importance of the occasion was further marked by the Governor and Directors of the Company by an invitation to the members to luncheon on the works, prior to the tour of inspection.

In spite of inclement weather, the attendance proved a remarkable one, and the number sitting down to table must have been about 200. The Association were further honoured by the presence of Mr. T. Hardie (the Chief Engineer of the Company), who occupied the chair at luncheon. At his table, also, were Mr. A. H. Solomon (Engineer of the Fulham Works), Mr. Grogono, Mr. E. E. Calvert (an Assistant Engineer at the works), Mr. W. Newton Booth (Senior Vice-President of the Association), Mr. W. L. Westbrook (Junior Vice-President), Mr. F. A. Frost and Mr. D. C. Cross (Past-Presidents), and Mr. Leonard Lacey (Hon. Secretary). After the honouring of the Loyal Toast,

An Almost Unlimited Sphere.

Mr. HARDIE said that, on behalf of the Governor and Directors of the Gas Light and Coke Company, he offered them all a very hearty welcome to the Fulham Works. They were particularly pleased to see the Association there that day, because the Assistant Engineer of the works was their President. From what he knew of Mr. Grogono as an engineer, and from the interest he took in the Association, he was sure that he would fulfil the duties entirely to the satisfaction of the members, and to his own credit. ["Hear, hear."] He congratulated Mr. Grogono on having been elected to this very important and distinguished position. They were also very pleased to see so large an attendance. It showed that the interest in the Association was being maintained, and from the papers that were contributed at the meetings and the discussions that took place upon them, it was perfectly evident that the whole of the members had the welfare of the Association thoroughly at heart. They had the great advantage of being connected with an industry to the ramifications and the development of which there was no limit. In fact it might almost be said that those entering the gas industry started upon a glorious adventure. On the mechanical engineering side, there was to be found commonly used in gas-works almost every type of power—steam, electric, hydraulic, pneumatic, and internal combustion. Indeed, he believed that all the types he had mentioned were to be found in the Fulham Works. On the civil engineering side there was no industry in which there was a greater variation in design, in size, and material used in construction than in connection with plant for the manufacture of gas. The problems here were never-ending. In the distributing department, they had to deal with continually increasing consumption, extended areas of supply, and more complicated structure of roads. These matters were always presenting new questions to the distributing engineer; while in the development of business and the ever-increasing number of purposes for which gas was used, there were constantly arising fresh problems for those connected with the sale of gas. Indeed, there was an almost unlimited sphere in the work which they had to carry out. He thought it was on account of this that the various Associations were able to maintain their activities so successfully; and especially was this the case with the Junior Associations which had grown up during more recent years. The duties of the members of those Associations were perhaps more circumscribed than those of the engineers and managers of the various undertakings. Their minds were more concentrated on particular problems, and their work brought them more intimately into touch with these problems. They carried out the investigations which, as a rule, led to progress, and therefore he was very pleased indeed to see so large and so strong a body in the London and Southern Junior Association. It ensured that the progress of the district would be a maximum progress, and that they would see in this part of the country as good a development as in any other. He would like, before sitting down, to give them as a toast the health of their President. [Applause.]

The Atmosphere of Fulham.

The PRESIDENT thanked Mr. Hardie very much for proposing his health, and the members for the way in which they had received the toast. During the tour of the works, the guides would take every care to let the members see all that they might desire to see; but there was one important element which they would not be able to show them, and that was the "atmosphere" in which those engaged at the Fulham Works carried out their duties. It was an atmosphere created solely by the Station Chief, Mr. Solomon. Fulham was a remarkably happy place in which to work. He felt sure their guides would tell them exactly the same thing. This was, of course, altogether due to the man in charge of the station.

The Industry One Great Whole.

Mr. W. NEWTON BOOTH remarked that the Association had paid many visits, and had invariably been received with the greatest kindness and hospitality wherever they went; but this particular visit would be an outstanding feature of their lengthy programme. As the premier undertaking of its kind, the business of the Gas Light and Coke Company was of enormous magnitude. Many who read the Governor's speech at the recent annual meeting of the Company were doubtless surprised to learn that the fuel output of the Company exceeded that of the whole of the electricity undertakings of the country; and very gratifying increases in the sale of gas continued, in spite of electrical competition. He personally felt confident that this increase would go on, as there was no reason to doubt that the gas industry was in a very healthy condition. The largest Company must, of course, have the most to show, and he anticipated that their hosts had further treats in store for the Association. Mr. Hardie had pointed out the great ramifications of the gas industry. There were very intricate scientific problems to be solved. The effect of the use of gas on the well-being of the community, on the industries of the district, and on the atmosphere, was very great indeed. Mr. Hardie had also told them that the members of the Junior Associations must to a very large extent specialize in the particular branches in which they were engaged. This, however, did not mean that, because a man specialized in one particular branch, the other branches should have no interest for him. The industry must be regarded as one great whole, and a proper understanding of the other parts was necessary for carrying out efficiently the duties appertaining to one particular part. The number of members present that day showed that, at any rate as regards the London and Southern District Junior Association, this fact was fully realized. It had been a great gratification to them to be invited to Fulham, where they all knew there was much to interest and instruct them. The works were in course of reconstruction, which meant it was a specially good time for inspection. The Company had also asked them to partake of lunch, which was by no means the smallest part of the day's pleasure. He therefore proposed that the very best thanks of the Association be accorded to the Governor and Directors of the Company for their invitation to visit the works, and for their generous hospitality. The Association were additionally honoured by the presence of the Chief Engineer, Mr. Hardie. [Applause.] Mr. Hardie was a very busy man, and yet he thought so much of the Association that he spared them a considerable portion of a Saturday afternoon. This was a great compliment, and he therefore had much pleasure in coupling with the vote the name of Mr. Hardie.

Mr. HARDIE thanked them all very much indeed for the hearty reception they had accorded this proposition. He said he was sure the Governor would be delighted to hear that the visit had been so largely attended. Unfortunately, Mr. Milne Watson was away on the Continent, or he believed he would have been present to welcome the members of the Association.

Round the Works.

For the subsequent tour of inspection, the members were divided into a number of groups, all following the same route, but in charge of guides devoted to various phases of the operations. This enabled members specially interested in any particular branch to select for his group the one which had for it a guide specially conversant with that branch. It was felt—and rightly—that in this way, the maximum amount of benefit could be extracted from the visit. The different parties were in charge of Messrs. Grogono, Calvert, Holdway, Ball, Davis, Heap, Cherry, Johnson, Lewis, sen., Lewis, jun., M'Laren, and Stewart (who was at these works when many of the members present visited them on a previous occasion).

In his Presidential Address to the Association last October, Mr. Grogono gave an outline description of the works, the site of which covers about 26 acres near the River Thames. A creek from the river, terminating in a dock, enables coal barges to come into the works to a position which is most convenient for the discharge of their contents. Coal may also be brought into the yard by rail. The Company possess other land on the river, and it is proposed in the near future to erect electric cranes on this for the unloading of coal, which will be conveyed by belts to the storage ground and the retort-houses.

The visit was particularly well timed, for work has just been started on a new 7 million c.ft. per day Glover-West vertical retort installation, consisting of sixteen beds. The scheme will comprise a complete unit of manufacturing plant right through—including a new exhauster-house, condensers, washing plant, purifiers, &c. It is anticipated that the work will be finished within two years. It is being carried through at the same time as the works are distributing their ordinary output. No. 1 retort-house is now being dismantled in preparation for the erection of these new verticals. In No. 3 retort-house, the capacity of which is 3 million c.ft. a day, there are twenty beds of ten retorts five tiers high; the retorts being 23 in. by 16 in. by 20 ft. long. The retorts are operated by one Fiddes Aldridge machine, the coke being removed by a drag-bar conveyor. No. 5 house (the last to be reconstructed) is similar to the last-named, except that the retorts are 22 ft. long. No. 4 retort-house contains eighteen settings of inclined retorts, which, however, have not been at work during the past two years. There are two sets of Humphreys and Glasgow twin water-gas generators, erected in 1909, of 2½ millions a day capacity. A third (blue gas) set, with a waste-heat boiler, was erected in 1919, having a capacity of 1½ millions. A waste-heat boiler has been added to No. 2 set during the past few months, and a third boiler of this character is contemplated for the present year.

The exhausters are housed in one building, and comprise eight sets, of the two-blade type, designed by Messrs. Gwynne & Co. The gas is exhausted before passing on to the condensers. There are two sets of atmospheric and two sets of water-tube (Clapham) condensers. These are followed by three sets of washing plant, each consisting of one Livesey washer and one rotary washer-scrubber. From this point the gas passes across the works by two 24-in. mains to tower scrubbers where the last traces of ammonia are arrested. There are five sets of purifiers, two of which, of more recent construction, are luteless. Of three station meters, two are allocated to coal gas, and one to water gas. The coal gas, before entering the meters, is washed with gas oil for the removal of naphthalene.

Five gasholders possess a total storage capacity of 10 million c.ft. The oldest of these holders was erected in 1856, while the small one used in connection with the water-gas plant is believed to date back to 1830. All the electric current required on the

works is generated, in a room adjoining No. 3 retort-house, by two 150 KW. vertical gas-engine driven dynamos. There are also three smaller units of 37 KW. capacity. It is proposed to replace these in the near future by an installation of larger steam-driven sets.

At the present time, coal is brought in barges into dock and unloaded by grabs. It is then conveyed by belts to a central crushing plant, and distributed therefrom to the several retort houses. There is a store of coal in the yard of about 20,000 tons, formed by means of small trucks fed by a push-plate conveyor. The heap is of "gridiron" shape in plan, 15 ft. deep, and ventilated by 4 in. cast-iron pipes. Very little trouble with heating is experienced.

The deep well, constructed in 1907, is a 12 in. borehole and 501 ft. deep. Water is raised by a 75 H.P. gas-engine driven air compressor installed by Messrs. Isler & Co. in 1916. The water, obtained at the rate of 7000 gallons per hour, is of excellent quality for drinking, and requires very little (if any) treatment before being used in the boilers.

At the entrance to the works are a large club room and a recreation hall—the existence of which, it may parenthetically be remarked, rendered possible the entertainment of so large a party as had assembled to do honour to their President. Here, at the conclusion of the inspection, the visitors found a welcome cup of tea awaiting them.

MIDLAND JUNIOR GAS ASSOCIATION.

A meeting of the Midland Junior Gas Association was held at the Council House, Birmingham, on Friday last, under the chairmanship of Mr. LEN H. THOMAS (President). The following were admitted to membership: Messrs. Donald Birch (Hereford), Harold Taylor (Central Laboratory, Nechells), Sherlock Millington (Birmingham Gas Fittings Department), Jack Watkins (Tipton), and Arthur B. Jones (Derby).

Mr. W. A. TWINE (Superintendent of the chemical plant, Birmingham Gas Department) gave a lecture on

CHEMICAL ENGINEERING IN MODERN GAS-WORKS PRACTICE.

Introducing his subject, the lecturer said that most of them read week by week the articles published in the "GAS JOURNAL," and other technical and trade journals; and in all it was interesting to note that during the past few years considerable attention had been paid to the subject of the training of the technical engineer. He proceeded: It would take more time than I have at my disposal if I were only to enumerate a few expressions of our leading authorities in the chemical and gas profession, so that I will content myself by making this statement. Chemical engineering has for its function the design and construction of plant and apparatus required for carrying out chemical processes on a manufacturing scale. It follows, therefore, that only persons possessing a knowledge of chemistry, physics, and mechanics, and who can employ this knowledge for the realization of chemical reactions on a large scale, can claim to be chemical engineers. Chemistry tells of the nature of raw materials; mechanics directs how to combine and arrange plant; and physics generally supplies any further data.

THE ENGINEER AND THE SCIENTIST.

Modern developments in gas engineering have been largely pioneered by scientists, especially by chemists and physicists; and I am confident that in the future only those who are prepared to make a study of chemical engineering with their other training, will be qualified as first-class gas engineers. Personally, I think this fact has been overlooked by those who have framed the syllabus for the training of the gas engineer of the future. We cannot fail to notice the number of patents which have been applied for in connection with the chemistry and physics of gas manufacture, but, of all the number, how very few prove successful when put into practice, largely because the scientist was not an engineer, or the engineer was not a scientist. It is the combination which is required.

Among many problems of a chemical nature to which men in the gas industry have devoted their attention, I may mention: The purification of coal gas by means of ammonia and other methods; increased quantity of nitrogen compounds in the form of either ammonia or cyanogen compounds; recovery of cyanogen compounds from coal gas, gas liquor, and spent oxide; manufacture of ammonium salts as sulphate, chloride, and carbonate; distillation of tar; removal of naphthalene; extraction of benzole; complete classification of coal; low-temperature carbonization; manufacture of sulphuric acid by combustion of sulphuretted hydrogen extracted from gas, and by treating spent oxide; manufacture of purifying material; and that of the chemicals necessary for the treatment or conversion of any products or residuals arising from gas manufacture.

MANUFACTURE OF CHEMICALS.

You are all well acquainted with the important action brought before Mr. Justice Astbury in the Chancery Division on Jan. 17, when a large Chemical Company brought an action against the Gas Light and Coke Company, and endeavoured to prevent the latter from manufacturing chemicals for the purpose of treating or working-up their residuals. Needless to say, everyone in the gas industry was delighted with the verdict given in favour of the Gas Light and Coke Company. Generally speaking, nothing but the friendliest feeling exists between the chemical and the gas industries; and this is as it should be, seeing that they are closely allied. Every few years, however, there seems to be a climax, after which, for a time, the relations become strained. I do not suggest that it is always the fault of those in the chemical industry; but I certainly feel that, largely owing to the short-sighted policy of some chemical manufacturers, gas undertakings are driven more and more into chemical manufacture, owing to the high prices charged on occasion for chemicals required, or the low price offered for gas residuals. It is only necessary to read or inquire into the history of various gas undertakings and sulphate or acid plants to realize the truth of this.

LIQUID PURIFICATION.

I should now like to draw your attention to the subject of the liquid purification of gas. Twelve years ago, in Birmingham, I had the privilege of erecting the plant for liquid purification experiments. It consisted of ammonia stills, desulphurizer, decarbonator, ammonia absorber for liquor ammonia, Claus kiln, limestone towers, &c. The research work carried out was divided between Dr. Davidson, Dr. Smith, Mr. Pearson (Windsor Street Engineer), and myself. The war put an end to our research, since when it has not been continued; but I am confident that the day is not far distant when the gas liquor on a large works will be distilled by means of waste heat from the retort-house. The H_2S and CO_2, 90 p.ct. of which will be driven-off practically free from ammonia, will pass through sulphuric acid (producing a small quantity of sulphate), and the H_2S will be burnt in a suitable furnace for the production of sulphuric acid. The remaining 10 p.ct. of H_2 will be absorbed by special iron compounds in properly designed plant.

Such a system of purification will necessitate the circulation of 150 to 200 gallons of gas liquor; and with the latest system of pipe services, ammonia losses will be reduced to an absolute minimum. The iron salts will be combusted in one section of the above-mentioned furnace, the gases from which will travel along with the still gases to the acid chambers. Cyanogen compounds will be extracted from the gas prior to treatment with gaseous or liquid ammonia in a manner similar to the present system in Birmingham—using sulphur (not spent oxide) which will be made on the works by limiting the air supply on one section of the furnace instead of burning all the H_2S to SO_2.

Mr. Twine insisted that cyanogen must be taken out of the gas, because of its action on holders, services, and internal fittings. As to ammonia washers, there were faults with many; but from a physical point of view, ammonia needed careful handling. The plant with the least "beating" action was to be preferred. Personally, he was partial to the slow washing plant of the mechanical brush type, with plenty of surface exposed. Referring again to liquid purification, it frequently happened, he said, that sufficient care was not shown with regard to ammonia losses. As to sulphate of ammonia, was it not a disgrace that, year after year, a sulphate that contained 0·3 p.ct. of sulphuric acid had been put on the market? Now the importance of the production of a neutral dry sulphate was recognized. Again, blue salt was practically unknown to-day, thanks to mechanical improvements on the off-take pipe of the still. The author concluded with a description of various plants, including one for benzole extraction which was erected at Nechells in the early days of the war, and a plant for the distillation of Mond-gas tar.

Discussion.

The CHAIRMAN remarked that there was much point in what Mr. Twine had said as to the necessity for closer working of the chemist and the gas engineer. The gas industry was part of the chemical industry; he had heard suggestions made by engineers which showed they had little idea of the chemical and physical side of things. By the amalgamation of the two, much greater progress would be made.

Mr. J. H. GEE (Central Laboratory, Nechells Gas-Works), in moving a vote of thanks to Mr. Twine for his address, expressed the hope that, as a result of the sharp increase in the price of petrol, and a falling-off in the cost of the production of gas, it might be possible again to bring benzole plant into operation. It seemed to him that gas engineering was only a branch of the larger subject of chemical engineering.

Mr. C. F. TOOBY (Coventry), who seconded, said that Mr. Twine had done well in stressing the importance of the close alliance of chemistry and engineering in the gas industry. The acquisition of knowledge on scientific principles was most essential, and those who were entering on the professional side of the gas industry would be well advised not only to get that knowledge, but to learn how best to apply it in practice.

The resolution was unanimously approved, and with Mr. Twine's reply the meeting terminated.

Gas-Turbines.—In a paper on the "Gas-Turbine" which he read before the Institute of Marine Engineers, Mr. Hugh Campbell said that many attempts had been made to realize the ideal of an internal combustion turbine, but nearly all the attempts had been failures, or somewhat akin to failures. The problem of the gas-turbine was much more difficult than many people believed; the obstacles that had been experienced appearing to be mainly metallurgical. Herr Leich, of Hamburg, had stated that he had a gas-turbine of 12,500 H.P. operating on blast-furnace gas in Upper Silesia, while five other turbines had been built varying from 500 H.P. upwards. Herr Leich stated that none of these turbines gave a thermal efficiency of less than 31 p.ct.

COMMERCIAL GAS COMPANY.

Annual Report and Accounts.

THE following is the report, for the year ended Dec. 31 last, which the Directors of the Commercial Gas Company will present at the meeting of shareholders on Thursday, the 21st inst.

The revenue account shows a profit for the year of £161,925 2s. 6d., which, added to the balance of £55,503 7s. 8d. brought forward from the previous year, amounts to £217,428 10s. 2d. After providing for the payment of dividend for the June half-year at the rates of 6 p.ct. per annum on the 4 p.ct. stock and 6 p.ct. per annum on the 3½ p.ct. stock, and for the debenture and other interest, there remains a balance of £135,364 0s. 8d., out of which the Directors recommend the payment of dividends for the December half-year at the same rate as that paid for the previous half-year—viz., 6 p.ct. per annum, less income-tax, on both the 4 p.ct stock and the 3½ p.ct. stock.

The Company have received notice that an application has been made to the Board of Trade by the London County Council under section 1 (3) of the Gas Regulation Act, 1920, for an Amending Order revising the powers of charging authorized in the Commercial Gas Company (Charges) Order, 1921, by reducing the standard price prescribed by that Order.

In conformity with the Acts of Parliament regulating the Company, the Directors have elected the Hon. Kenneth Mackay to the vacant Directorship caused by the decease of their esteemed colleague Mr. Roland Yorke Bevan.

The Directors have made a further reduction in the price of gas as from the 1st of January, 1924, of ⅛d. per therm, equalling 3⅝d. per 1000 c.ft., making the present price of gas 8⅛d. per therm, or 3s. 5⅝d. per 1000 c.ft.

Mr. H. E. Jones, Sir Frederick Green, K.B.E., and the Hon. Kenneth Mackay, three of the Directors, retire by rotation, and, being eligible, offer themselves for re-election.

Mr. B. W. Ellis, one of the Auditors, will go out of office by rotation, and, being eligible, offers himself for re-election.

WILLIAM GRAHAM BRADSHAW, *Chairman.*

Gas-Works, Stepney, Jan. 24, 1924.

The Accounts.

The accounts accompanying the report consist of the usual set of statements. They show that the paid-up stock on Dec. 31 last amounted to £996,405; that £1,076,875 had been added by conversion, making £2,073,280; and that £254,298 remained unissued out of the total authorized capital (including premiums) of £2,340,000. The total amount borrowed at this date was £339,062 10s., and £135,937 10s. was added by conversion, making a total of £475,000, and leaving £114,226 to be borrowed, out of the £585,000 authorized.

The capital account receipts amount (with premiums) to £2,606,065. The expenditure stands at £1,512,637, with a nominal amount of £1,212,812 added by conversion—together £2,725,449. There is thus a balance of £119,384 carried to the balance-sheet. A sum of £7295 was expended during the year on freehold property, and £4547 on new and additional stoves; but £22,020 is credited for steamships, plant, and prepayment meters and fittings.

The reserve fund amounted at the close of the year to £54,692, and the insurance fund to £33,074.

Statement of Coal and Oil.

—	In Store Dec. 31, 1922.	Received During Year.	Carbonized During Year.	Used and Sold During Year.	In Store Dec. 31, 1923.
Coal—tons	33,058	241,297	245,589	745	28,021
Oil—gallons	673,066	516,491	593,642	..	595,915

Statement of Residual Products.

Description.	In Store Dec. 31, 1922.	Made During Year.	Used During Year.	Sold During Year.	In Store Dec. 31, 1923.
Coke—tons	5,765	165,773	24,824	142,744	3,970
Breeze—tons	1,582	17,931	..	18,128	1,385
Tar—gallons	425,671	2,620,891	..	2,646,511	400,051
Ammoniacal liquor—butts of 108 gallons	15,030	89,937	92,791	..	12,176
Sulphate of ammonia—tons	222	3,036	..	3,174	84

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Quantity Accounted for.	Number of Public Lights.
	Public Lights and under Contracts (estimated).	Private Lights, per Meter.		
Therms. 19,505,998	Therms. 306,607	Therms. 17,351,959	Therms. 17,951,152	3293

The following is the revenue account:

Receipts.

Sale of gas—			
Per meter (number in use, 117,059) at 9·6d. per therm	£668,126 14 3		
Public lighting and under contracts	21,658 5 9		
		£689,785	0 0
Rental—			
Meters (26,663)	£9,181 14 0		
Stoves (97,584)	36,106 0 2		
Prepayment meters and fittings (89,827)	48,377 7 10		
Maintenance of mantles and fittings	1,927 7 4		
		95,592	9 4
Residual products—			
Coke	£201,504 2 3		
Breeze	4,050 19 10		
Tar	76,271 7 10		
Ammoniacal liquor and sulphate of ammonia	35,921 14 5		
		317,748	4 4
Miscellaneous receipts—			
Rent receivable	£508 4 10		
Transfer fees	66 0 0		
		574	4 10
Total receipts		£1,103,699	18 6

Expenditure.

Manufacture of gas—			
Coal and oil, including dues, carriage, unloading, and trimming	£418,271 14 6		
Salaries of engineer and officers at works	13,983 8 0		
Wages (carbonizing)	42,378 3 3		
Purification, including labour	6,481 16 10		
Repair and maintenance of works and plant, materials and labour (less £2143 11s. 5d. received for old materials)	145,824 8 7		
		£626,939	11 2
Profit sharing		20,234	0 1
Distribution of gas—			
Salaries and wages of officers (including rental clerks)	£29,202 2 6		
Repair, maintenance, and renewal of mains and services, material and labour	40,648 2 7		
Repair and renewal of meters	10,271 2 4		
" " " " stoves	47,282 18 4		
" " " " prepayment meters and fittings	41,600 2 7		
Maintenance of mantles and fittings	2,532 19 5		
		171,537	7 9
Public lamps—lighting and repairing		8,804	11 11
Rent, rates, and taxes		58,771	9 0
Management—			
Directors' allowance	£4,750 0 0		
Company's Auditors	150 0 0		
Salaries of Secretary, Accountant, and clerks	5,389 19 8		
Collectors' salaries and commission	5,653 14 9		
Prepayment meter collection	18,575 12 11		
Stationery and printing	4,820 11 2		
General charges	8,264 10 4		
		47,604	8 10
Bad debts		529	0 2
Law and parliamentary charges		259	5 2
Superannuations and Allowances, and Workmen's Benefit Society, &c.		21,747	4 0
Official officers, &c.		619	11 3
National Health and Unemployment Insurance		4,678	6 8
Total expenditure		£941,774	16 0
Balance carried to net revenue account		161,925	2 6
		£1,103,699	18 6

Total wages paid in 1913, £119,010
" " 1923, £266,548
Total salaries paid in 1913, £22,976
" 1923, £62,142

The final statement is the balance-sheet, which gives the value of the stores in hand at the close of the year, as follows: Coal, oil, &c., £53,149; coke and breeze, £4111; tar, ammoniacal liquor, sulphate of ammonia, &c., £14,876; sundry stores, £56,776—total, £128,914. The figures a year ago were: Coal, oil, &c., £56,737; coke and breeze, £5947; tar, ammoniacal liquor, sulphate of ammonia, &c., £15,536; sundry stores, £57,818—total, £136,040.

Dempster-Toogood Vertical Retorts at Swindon.

The current number of "Engineering" contains the first of a series of illustrated articles dealing with plant which has recently been installed at the Great Western Railway works, Swindon, for supplying the works with gas for lighting and for use in the numerous gas-fired furnaces required for the heat treatment of steel and other heating processes. The plant, which was designed and constructed by Messrs. Robert Dempster and Sons, Ltd., of Elland, consists of an installation of continuous vertical retorts on the Dempster-Toogood system, capable of carbonizing daily 240 tons of coal, and yielding about 3 million c.ft. of gas of a calorific value of 500 B.Th.U. In addition to the carbonizing plant, the installation includes elevators and conveyors for handling coal and coke, bunkers for storing both materials, screening and washing plant for coke, and a breeze briquetting plant, as well as a gas-driven electric generating station which supplies the whole of the power required for operating the plant. In the lay-out of the plant, the facilitating of future extensions has been kept in view. For this reason the whole of the auxiliary plant is grouped at one end, leaving sufficient free space at the other end for the erection of a second carbonizing plant of like capacity. An order has also been placed with Messrs. Dempster and Sons for the construction of a new holder of a capacity of 2½ million c.ft.

Gas Oil.—The "Petroleum Times" says that gas oil is now quoted at 5½d. per gallon, net and naked, *ex* wharf. An increase in price of ½d. per gallon was made on the 2nd inst.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Burnage Works of Messrs. Hans Renold, Ltd., of Manchester.

The Association enjoyed a visit to the works of Messrs. Hans Renold, Ltd., on Wednesday last. The members were conducted round the works by eight technical guides.

The machines in use for testing chains are most ingenious. In one test the completed chain is driven at 10,000 r.p.m. for many hours. Each link is then carefully examined.

After tea, which was served in one of the large dining halls and lecture theatres, Mr. HERFORD (Works Manager) expressed on behalf of the firm pleasure at being able to show their works. He always enjoyed going through a gas-works. While some of them might consider that the works seen that afternoon showed a tendency to over-refinement, it must be remembered that at gas-works it was not as easy to be so exact and nicely ordered. He suggested that gas engineers could aim a little higher in this respect. Perhaps what they had seen would induce them to do so. Hans Renold's had always considered quality as the first consideration, and attention was given to every detail. Electric power was used; standard and interchangeable motors, 12 and 20 H.P., being employed. They had a profit-sharing scheme, works committees, &c., for their 1650 employees; and there was a continuation school for boys up to 18 and girls up to 16 years of age. Each spent a full day at school, with all wages paid; and the course taken was the one approved by the Manchester Education Committee. In the very near future they intended to publish a special booklet for gas engineers, dealing with chain driving as applied to gas-works.

Mr CARTER (Liverpool), in moving a vote of thanks to the firm, spoke of their world-wide reputation. He had been pleased to notice the high degree of accuracy and the keen inspection to which all the various materials were subjected. The visit that afternoon was the culmination of the desire of the Association for the last ten years. He paid high tribute to the technical guides.

Mr. BATTERSBY (Bury), in seconding, remarked that the firm had attained a splendid reputation for good organization.

Mr. J. T. HAYNES, A.M.Inst.C.E., who in the absence of the President (Mr. J. H. Clegg) presided, passed on the vote, and expressed his own personal thanks.

Mr. HERFORD (Works Manager) suitably replied.

NAPHTHALENE.

Mr. H. P. LUPTON, B.Sc., A.I.C. (Liverpool), thereafter read a paper on "Naphthalene." This was published in the "JOURNAL" for Jan. 30, p. 262.

Mr. WILLIAMS (Crewe) moved, and Mr. HASLAM (Bolton) seconded, a vote of thanks to the author for his paper.

Mr. HAILSTONE (Rochdale) asked whether the surface temperature was a mean temperature. How far away from the works were the tests taken?

Mr. LUPTON replied that the surface temperature was the average during the whole of the day and week, and was taken 3 ft. down in the ground, by the side of a gas-main. The calorific value of the gas was about 490 B.Th.U. per c.ft.

Mr. CARTER (Liverpool) remarked that naphthalene always seemed all or nothing. Undoubtedly the weather was the most important cause of stoppages. He thought that carburetted water-gas plants helped to dispose of naphthalene troubles. The salt should, if possible, be extracted at the condensers. The question of naphthalene fog should be studied. Research on this matter might reveal something helpful.

Mr. GREENWOOD (Buxton) thought the author had done very well in reducing the 20 gallons of oil per 1000 c.ft. mentioned in the paper to such a low figure as 11 gallons.

Mr. BATTERSBY (Bury) expressed the opinion that atomizing was to be preferred to vaporizing. A good set of water-cooled condensers was essential on all works.

Gas-Engine Pistons and Piston Rods.—The "Iron and Coal Trades Review" for Feb. 1 illustrates an arrangement of gas-engine pistons with special piston rod and two packings in the middle head, designed by the National Gas-Engine Company, Ltd., of Ashton-under-Lyne. The new design consists of a flanged steel piston rod secured to the top piston by studs through the flange. The bottom end of the piston rod shoulders on to the bottom piston, through which it is tapered to a large nut inside. As a steel rod would not work satisfactorily in the middle head packing, a cast-iron sleeve is forced on to the rod in a manner similar to that by which the cylinder liners are forced into gas-engine cylinders. By the new design, not only is greater strength obtained in the connection, but there is a better cooling of rod and pistons, owing to the improved contact between the various parts. The lower temperature of the pistons during the running of the engine reduces the amount of carbonization on them, and there is thereby less tendency to pre-ignition. The pistons are made so as to be interchangeable with those of the older design, so that they may be adapted without difficulty to existing engines. The new piston has been thoroughly tested during the past twelve months in a vertical tandem gas-engine working on coke-oven gas and on a heavy load factor.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Our Visitor from Japan.

SIR,—Please allow me to thank you for having published my letter *re* gasholders in Japan. As a result of the invitation to British manufacturers to send me their catalogues, I have received many of great interest, and would like to take this opportunity of thanking those firms to whom I have not been able to write personally, owing to the shortness of the time at my disposal. I am, however, taking their catalogues home with me.

Fortunately, my works were not seriously affected by the earthquake. This is my first trip round the world, and everyone has been so kind to me that I have seen very many things of interest. I am always on the look-out for improved methods, and try to keep my works up-to-date. We have Drake's horizontal retorts, Tully plant, and Holmes' washers. So you see we appreciate British manufacture.

I have obtained great assistance from your British Commercial Gas Association, and feel sure that I shall be able greatly to increase my gas sales as a result of the excellent methods they have kindly shown me. I am interested to find that British gas engineers resemble Japanese gas engineers in their love of golf, which is very popular with us. I have enjoyed meeting most of your leading professionals, and I hope that any British gas engineer visiting Japan will come and have a round with me.

Again thanking you and those engineers who have been so kind to me, and looking forward to my next visit to your country,

S. KUBO,
Managing-Director of the Kobe Gas Company, Ltd.

St. Andrews, Feb. 5, 1924.

REGISTER OF PATENTS.

Hotplates.—No. 209,356.

FLAVEL, P. W., of Leamington.

No. 11,738; May 1, 1923.

This invention, relating to hotplates, has for its object to allow free access of the flame to the bottom of the vessel to be heated, while the construction of the hotplate remains substantially as usual.

Accordingly, the rests for the vessel comprise parallel bars arranged on each side of the burner and individually engaging recesses in the hotplate, a shorter intermediate parallel bar one of whose ends engages a recess in the hotplate or is supported by a cross bar or the like carried by the longer parallel bars, and a cross piece supporting the other end of the shorter bar. The cross piece is preferably curved and situated well below the parallel bars. It may be in one with its bar and be supported by the long parallel bars, or it may take the form of a junction ring interlocking with the ends of two shorter bars.

Hotplates.—No. 209,454.

HELPS, G., of Nuneaton.

No. 24,507; Sept. 11, 1922.
No. 9939; April 12, 1923.
No. 17,634; July 7, 1923.

This invention describes in detail the arrangement of, and various methods of framing-up, cooker hotplates, with the view of securing maximum efficiency and minimum waste of space. The detail drawings number seventeen.

From the general enunciation of the complete specification, it is seen that, according to one feature, a hotplate is composed of bars forming grids, the hotplate being carried by clips, brackets, or supports, secured to such bars and attached to the oven or cooker. According to another feature, the hotplate is comprised of several flat or other section metal bars, threaded or framed together, or secured by welding, forming a grid. The separate bars are secured together with bolts or rivets, or both, and have suitable distance pieces between them; the distance pieces taking any convenient form. The bars being on edge may be twisted for a short distance to allow of their being riveted to a flat angle or other section support. These bars may run at right angles to the front of the hotplate, or parallel to it. Bars to carry burners may be curved downwards and continued across the spaces round the burners; the latter resting on them.

Regenerator Furnaces.—No. 209,458.

TOOGOOD, H. J., and DEMPSTER, R., & SONS, LTD., both of Elland.

No. 24,743; Sept. 13, 1922.

This invention relates to regenerator furnaces for horizontal retort settings. The patentees point out that with regenerators as generally constructed horizontal floors or walls of tubes and horizontal ledges are presented to the waste heat, and in course of time the impalpable dust, of necessity contained in the waste gases or products of combustion, is deposited in the waste-heat passages, causing chokes and a variable resistance to the working by induced draught, which upsets the regularity of the process.

According to the present invention, the regenerator is constructed of staggered vertical tubes of extra large cross-sectional area both for waste heat and for secondary air. These tubes are arranged in contact, two thin walls intervening between the waste-heat and the secondary-air passages, and the joint of each tube being covered by

the wall of an adjacent tube. The interior surfaces of the tubes are quite smooth, no ledges being presented for the accumulation of dust; and, furthermore, should a fire-crack develop in the thin wall of one tube, it is covered and safeguarded against short-circuiting by the thin wall of the adjoining tube.

To obtain the maximum of regeneration, the secondary-air inlets are situated at the lowest practical level, and preferably on a lower level than that of the waste-heat dampers, whereby the maximum depth of heated brickwork is vertically traversed by the secondary air. The maximum height of rarefied air is also at all times within the regenerator—that is, for any given depth of brickwork—so that the chimney effect of this increased column of rarefied air, coupled with the smooth interior of the tubes, assists the secondary air to reach the combustion chamber with a minimum maintenance of draught. It has been proposed, say the patentees, to employ batteries of vertical waste-heat and secondary-air tubes arranged in contact with one another in a generator for heating vertical retorts.

Gas Cooking and Heating Apparatus.—No. 209,626.

READ, J. C. C., and DUDDY, D. E., both of Gunnersbury, and GODFREY, W. H., of Hampton Wick.

No. 6128; March 2, 1923.

This invention relates to atmospheric gas apparatus for cooking and heating, and more particularly to a stove of the kind comprising an upright perforated member rendered incandescent, a plate member inclined with respect to the vertical member to direct the said flames on to the latter, and an atmospheric burner arranged at the lower part of the space between the two members.

A feature of the invention is that the grid comprises a series of parallel wires extending between the bars of the frame. The grid and inclined member may be of rectangular form, and the burner straight tubular; or the grid may be cylindrical, and the inclined member of inverted truncated conical form, with the burner of ring form.

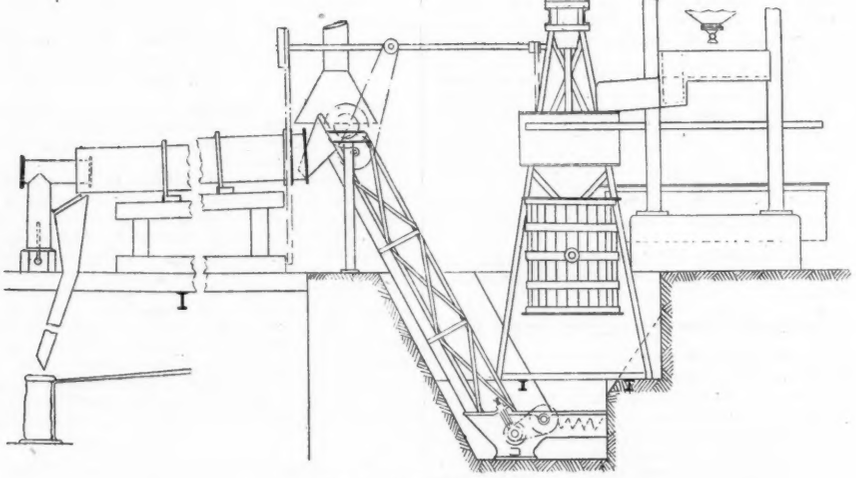
Neutralizing Ammonium Sulphate.—No. 209,561.

NICHOLSON, T., of Willington.

No. 32,134; Nov. 24, 1922.

Introducing this specification, the patentee points out that farmers dislike sulphate which is too finely divided, because it is blown away in windy weather while it is being applied to the land. Therefore he has devised a method by which "the crystals can be neutralized without bruising or grinding, so that a relatively coarse granular product is obtained."

The process is carried out in such a plant as is shown in elevation in the accompanying drawing. The crystal sludge is initially run from a cock into trays, whence it is passed into a centrifugal drier. This is rotated until a substantial amount of the water has been removed from the salt—*e.g.*, until the water content has been reduced below about 2 p.ct. The crystals are then removed from the bottom of the centrifugal, and are caught in a cask or barrel. The cask is then closed, a calculated amount of strong aqueous ammonia added, and the cask rotated about the horizontal axis. The cask is about four-fifths filled with sulphate crystals from the centrifugal, and is rotated for about 5 minutes at the rate of 7 or 8 revolutions per minute.



Nicholson's Sulphate Plant.

The crystals after neutralization are emptied out of the cask in any convenient manner, and are transported by means of a conveyor to the rotary drier [shown broken]. This consists of a slightly inclined cylinder down which the crystals drop as the cylinder is rotated; a current of air, preferably warmed, being passed through in counter current to the descending crystals. The crystals pass through the drier in about 3 minutes, and are discharged by suitable means from the lower end.

The patentee claims that the process is particularly useful in treating the larger crystals of sulphate of ammonia obtained by the indirect process, since the crystals are obtained suitably dry and neutral and substantially unbroken. It can, however, be applied to the treatment of crystals obtained by the direct or semi-direct processes, although in these cases it is advisable to provide the container with baffles to divide the mass of crystals. Devices which bruise or grind the crystals are to be avoided.

While strong ammonia liquor has been cited as the neutralizing agent, good results can also be obtained by the use of a concentrated solution of soda ash, or solid soda ash and equivalent neutralizing agents may be used; the soda ash apparently generating ammonia which is uniformly distributed throughout the mass of crystals in the closed chamber. The patentee prefers to use ammonia solution, as this gives a salt having a higher content of NH_3. He does not, however, include the use of gaseous ammonia in the process, "as this is difficult to measure when added as such—*i.e.*, when introduced into the apparatus in the gaseous form."

Tubular Gas-Burners.—No. 209,621.

KEITH & BLACKMAN CO., LTD., and KEITH, G., of Farringdon Avenue, E.C.

No. 5177; Feb. 22, 1923.

This invention relates to gas-burners of the type comprising a tube formed with a longitudinal slot between the edges of which is clamped an edgewise disposed transversely crimped or corrugated metallic strip. An object of the invention is to adapt a burner of this type for combustion of an increased volume of gas.

To increase the total area of the outlet, it is proposed to make the slot sufficiently wide to accommodate a pair of corrugated strips, in parallel, with a plane strip sandwiched between them; and in the corrugated strips along the ridges orifices, preferably elongated in the direction of the corrugations, are formed, so that part of the mixture will flow from the interior of the burner tube through the orifices in the corrugated strips and issue between these and the plane strip.

As the strips are liable to become more highly heated than the body of the burner, and as provision must be made to accommodate the additional expansion of the plane uncorrugated strip, the slot is formed slightly longer than the strips, and cover plates are secured by screws at each end of the slot, so that there will be no risk of the burner lighting back due to exposure of gaps at the ends of the slot.

Opening and Crushing Fuel during Distillation. No. 209,352.

WOLLASTON, F. R., of Manchester.

No. 10,366; April 17, 1923.

This specification covers features which are applicable to the pre-carbonizing retorts of a plant such as that described in patent No. 207,700 [see "JOURNAL" for Jan. 9, p. 96]. According to the present invention, the revolving trays which form compartments in the retorts are not all horizontal, but alternately horizontal and dished; the fuel falling through near the periphery of the horizontal trays and then being worked to centre apertures in the dished trays. Each compartment has its plough member; and in addition there is provided a taper-worm crusher which acts on the fuel as it reaches the exit from each dished tray. The crusher revolves with the central shaft, trays, and ploughs, and assists in "deflecting, opening, and crushing the fuel."

Gas Lighting Switch.—No. 209,534.

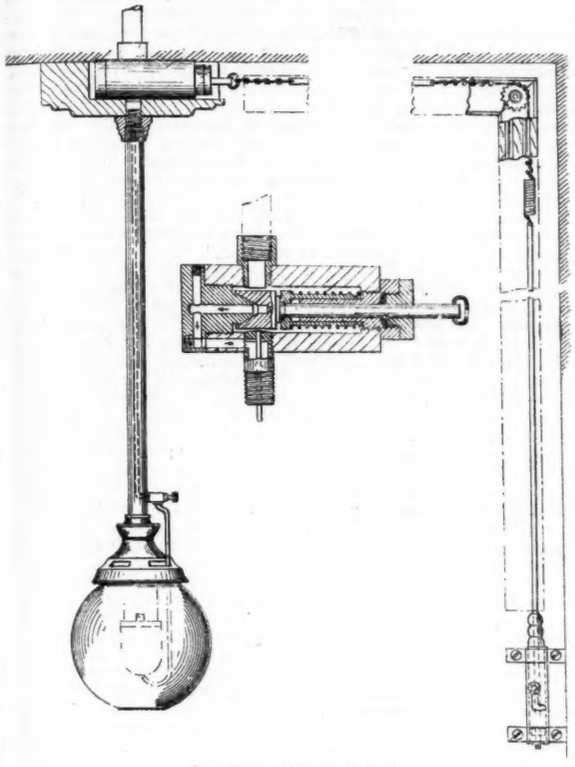
SWAN, J. W., and BOWEN, H. J., both of Coventry.

No. 30,288; Nov. 6, 1922.

This invention relates to a switch for gas-lighting points. It provides for positive mechanical action without the agency of electricity; a pilot light being necessary. Reference to the switch was made in a short paragraph on p. 207 of "THE GAS SALESMAN" for November last.

We reproduce a diagram showing a complete installation, and a section through the valve fitting. The latter, it is pointed out, may be contained in the block or ceiling rose of the fitting; and its construc-

tion is clearly shown in the drawing. It is well contrived, and precautions are taken to rule-out the possibility of leakage. Thus, the conical valve only opens a very small fraction of an inch, and the rear face of the valve block takes a conical seating on a sleeve (spring-pressed) which works over a boss. The other end of the sleeve presents a ground face to the plug. Finally, the spindle passes through a stuffing box and gland.



The Swan-Garner Switch.

The necessary movement is imparted to the valve through the medium of a flexible lead (preferably "Jagut," a commercial preparation); chains and sprocket wheels being introduced at corners. The lead terminates in a spring-held plunger.

It is pointed out that the control may be entirely cased in the manner of electric light wires. The patentees provide the by-pass tube within the drop-pipe for a distance, in the case of ceiling fittings.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Feb. 6.]

Nos. 2165 to 2793.

BETTISFIELD TRUST COMPANY, LTD.—"Distillation and carbonizing of coal, &c." No. 2590.

COOPER, A.—"Valve for controlling flow of liquids." No. 2578.

DEMPSTER, R., AND SONS, LTD.—"Regenerator furnaces." No. 2510.

GUMPERZ, A.—"Gas-mantles." No. 2281.

HINDE, J. W.—See Cooper, A. No. 2578.

KEITH, G., AND KEITH AND BLACKMAN COMPANY, LTD., J.—"Lubricating device for compressors." No. 2564.

KEITH, G., AND KEITH AND BLACKMAN COMPANY, LTD., J.—"Grill or gas-cooker." No. 2565.

KILLING, F.—"Inverted incandescent gas-lamps." No. 2363.

KILNER BROS., LTD.—"Gas-fired furnaces." No. 2511.

KNOWLES, F. W.—See Kilner Bros., Ltd. No. 2511.

KOPPERS COKE OVEN COMPANY, LTD.—"Apparatus for washing liquids with liquids." No. 2355.

LOEBELL, H. O.—"Manufacture of combustible gas." Nos. 2567, 2568.

MEYER, A.—See Gumperz, A.—No. 2281.

PATERSON, W.—"Control of flow of liquids." No. 2681.

PERKIN, F. M.—See Bettisfield Trust Company, Ltd. No. 2590.

RICHARDS, S. W.—"Connections for pipe mains." No. 2505.

STILL AND SONS, LTD., W. M.—See Cooper, A. No. 2578.

SYNDIKAT FÜR GASFORSCHUNG.—"Dry distillation of bituminous fuel." No. 2694.

TOOGOOD, H. J.—See Dempster, R., and Sons, Ltd. No. 2510.

Cannock and Hednesford Gas Company, Ltd.—The report of the Company for the year ended Dec. 31 shows that the receipts on revenue account were £38,077—an increase of £2000 over the previous year. The expenditure totalled £31,275, compared with £32,824 in 1922—leaving a balance of £7599, as against £3501. The Directors recommend a dividend of 8 p.ct., which will absorb £3658. After transfers to various funds, £1905 will be carried forward. Reference is made to the death during the past year of Mr. William Jones, who had been a Director of the Company for 48 years, and Chairman for 26 years.

LEGAL INTELLIGENCE.

TEST CASES AFFECTING VALUATION OF SCOTTISH UNDERTAKINGS.

Important Decisions from the Court of Session.

In the Lands Valuation Appeal Court of Scotland—before Lords HUNTER, SANDS, and ASHMORE—decisions of considerable importance to the industry have just been given in appeals taken by the Stranraer Gas Company, Ltd., and the Cowdenbeath Gas Company, Ltd.

THE STRANRAER CASE—NEW PRINCIPLE INTRODUCED.

Counsel for appellants, Mr. COOPER. (Agents, Messrs. Pairman, Miller, and Murray, S.S.C., Edinburgh; and J. M. Hunter, Solicitor, Stranraer.) Counsel for respondents, Mr. KEITH. (Agents, Messrs. Macpherson and Mackay, W.S., Edinburgh; and John Bennock, Solicitor, Stranraer.)

By the decision reached in the appeal taken at the instance of the Stranraer Gas Company, a new principle has been introduced into the valuation of gas undertakings. It may be recalled that the Assessor valued the undertaking at £1014 per annum, as against £746 previously—which figure the appellants contended it ought to be. The local Valuation Appeal Court in Stranraer upheld the contention of the Assessor; but in the Court of Session, Edinburgh, the Company's appeal has been sustained.

It may be explained, briefly, that the grounds of the appeal were represented to Lords Hunter, Ashmore, and Sands as follows: First, it was urged as an objection that the Assessor had included in his figures the receipts from the hire of meters and cookers, and should not have added back the expenditure attending the repair and upkeep of these articles; secondly, that the Assessor should have included under the heading of tenant's capital the value of the cookers in use by the Company; thirdly, that the interest allowed on tenant's capital should be at the rate of 7 p.ct., as during the period of the accounts money could not be borrowed from the bank under 7 p.ct.

Lord SANDS, who gave the leading opinion, said that the first question which arose was whether, in stating the accounts of the gas undertaking for the purposes of valuation on the revenue principle, the receipts from meters and from stoves and cookers, as they were generally called, on the one hand, and the expense of maintaining them, on the other, fell to be included. The Assessor sought to exclude both. The appellants sought to include both. This attitude of the respective parties showed clearly that there was a working loss under this head. It seemed to follow from this that the Gas Company supplied these fittings, not as a separate business, but in order to further the sale of gas, from which their main revenue was derived. The use of meters was essential to the conduct of gas supply. The Company might conceivably insist upon each consumer providing and maintaining a meter for his premises as a condition of giving a supply; but this would be a departure from the practice of the industry, which would probably operate most injuriously to the Company, and tend to discourage the demand for gas. Cookers were not like meters—an essential to gas supply—though no doubt they encouraged and increased consumption. The considerations against their supply by the consumer were perhaps not so cogent as in the case of the meters. But the need for capital outlay by the consumer would no doubt tend to discourage their installation, and, in practice, their provision by the gas undertaking had come to be regarded as an ordinary incident of gas supply, essential to the due development of the industry, particularly in competition with electrical supply. In these circumstances, it appeared to his Lordship that the hypothetical tenant of a gas-works would allow for the necessity of providing and maintaining meters and cookers, if the industry for the conduct of which he proposed to hire the works was to be successfully prosecuted. In this way, disbursements and receipts here in question ought to be taken into account in a valuation according to the revenue principle. The contrary was said to have been decided in 1905, in the case of the Kirkcaldy Gas Light Company. There a distinction was drawn between meters and cooking stoves. The former were necessary to the carrying-on of the gas business; the latter were not, but were regarded as an independent business, which a company might undertake, and not as ancillary to the making and supply of gas for which the premises to be valued were used. It was perhaps a good ground for discrimination at that time; but the supplying of cookers had now become an ordinary and, from the commercial and competitive point of view, a necessary incident of the gas industry. Accordingly, in his Lordship's view, that case was not applicable to the present conditions of the industry. He further saw no ground for discrimination between meters and cookers in dealing with the question of tenants' capital. As to the rate of interest to be allowed upon that capital, the decision reached in the Cowdenbeath case, that it ought to be fixed at 5 p.ct., applied also here.

Lord ASHMORE, dealing with the area in question, said that in his opinion the value of the gas-cookers ought to be included as part of the tenant's capital. *Prima facie* the Gas Company provided these cookers in the normal conduct of their gas business; and, in the absence of any evidence to the contrary, he thought it would be inconsistent with the actual facts to hold that the cookers should be excluded from the tenant's capital. It followed, in his opinion, that there ought to be included in the revenue of the Company the receipts from the hire of the cookers, and there should be deducted the expenditure attending the repair and upkeep of the cookers.

Lord HUNTER concurred.

THE COWDENBEATH APPEAL.

The same trio of Judges heard the argument in a bigger issue which was raised at the instance both of the Valuation Assessor for the district and of the Cowdenbeath Gas Company, Ltd. At the Valuation Appeal Court, the appellants, who then were the Gas Company, repre-

sented that the valuation for the year 1923-24 should be reduced from £2445 to £1167. At this Court, it was explained that the Assessor's valuation had been arrived at by taking the net balance for the year to April 30, 1923, on the Company's revenue account, and giving allowances for interest on tenant's capital and for tenant's profits, thereby bringing out the net assessable revenue of £4612. This total, when averaged with the figures for 1920-21 (£1823) and 1921-22 (£901), gave a valuation of £2445.

It was maintained, on behalf of the Company, that the fees of the Directors and Auditor should be allowed as a deduction from revenue, in respect that they were employed on the business of the Company in their capacity as tenants; that the floating capital, which represented a sum of £8210, was necessary to enable them to carry on their business satisfactorily. It was further claimed by them that the sums of £1091 for stocks (including £440 for coal and £651 for fittings and residuals), £2812 expenditure on free fittings, and £6330 capital expenditure on services, were all necessary for these purposes, and that a cash allowance of 10 p.ct. for rates was required to meet large claims in respect of rates and taxes. They put forward the additional contention that interest at 10 p.ct. per annum on tenant's capital should be allowed in respect that a hypothetical tenant would find it impossible to get capital at a lower rate, and that 33⅓ p.ct. ought to be made in name of tenant's profits from the divisible surplus of receipts over expenditure, in respect that the tenants required a special sum in reserve for emergency purposes.

The main arguments adduced by the Assessor were that a valuation of the premises should be dealt with purely on a revenue basis; that a large part of the energies of the officials must be held to be devoted to their duties as landlord, and not as tenant; and that a deduction of one-half of the fees of the Directors and Auditor was fair. So far as floating capital was concerned, the Assessor indicated that he would allow one-third of the actual annual expenditure, bringing out thereby a figure of £6492, rather than £8210. The figure for stocks would be taken at £651; but he strongly represented that no allowance should be made in respect of free fittings and the outlay on services. He was not disposed to admit the reasonableness of a deduction in the cost of piping from the main to the meter. This he took to be an item which must be regarded as heritable. Neither, he averred, ought there to be any allowance in respect of payment of rates and taxes. His objection to this was that one-third of the working expenses was allowed to cover the amount needed to carry on, and there was a substantial revenue which, as was disclosed by the evidence, came in more or less continuously. On the other hand, the Assessor was prepared to allow 5 p.ct. with regard to interest on tenant's capital, and so far as tenant's profits were concerned he had made an allowance of 20 p.ct.

The local Valuation Committee took the view that the Directors' and Auditor's fees should be allowed *in toto;* that the tenant's capital should consist of floating capital £6586, stocks £1091, and expenditure on free fittings £2812; that no allowance should be made in respect of the expenditure of £6330 claimed for services, nor for payment of rates and taxes; that the rate of interest on tenant's capital be 7 p.ct.; and that the tenant's share of profits be fixed at 20 p.ct. In so far as the appellants had claimed 33⅓ p.ct. for emergency purposes, the Valuation Appeal Committee were predisposed to the view that damage from explosion and subsidence would affect the structure, but it could not injure to the extent claimed the interests of a hypothetical tenant. It was on these grounds the Court at First Instance —namely, the Valuation Appeal Committee—had fixed the valuation at £2191. Against this decision, both the Cowdenbeath Gas Company and the Assessor himself appealed.

After a lengthy argument by Counsel on both appeals,

Lord HUNTER, who gave the leading judgment, said it was admitted that the subjects fell to be valued in accordance with what was known as the revenue principle. So far as the questions argued before the Judges of the Court of Session were concerned, it was necessary to consider only the figures for the year ended April 30, 1923, and parties were agreed that for that year the total receipts were £25,867. There was a claim on behalf of the Company to include the sums of £315 and £47, which represented payments to the Directors and the Auditor of the concern. As a question of principle, it appeared to him as quite sound that, where a company were both owners and occupiers of heritable subjects which were used for commercial enterprise, the expenses of management might fall to be apportioned between landlord and tenant. They had been informed by the Valuation Committee that they regarded these fees as being due in respect of services rendered entirely in connection with the production or the distribution of gas. In these circumstances, he did not think the Court ought to interfere with the determination of the Valuation Committee in favour of the Company on this point. The total expenditure for the year to April 30, 1923, amounted to £20,826, and in estimating tenant's capital the Company claimed that a sum equal to five-twelfths of the working expenditure of the undertaking should be treated as floating capital. The Valuation Committee had fixed one-third as the suitable proportion. There was no absolute rule on the matter, but his Lordship was satisfied that the amount allowed by the Committee was adequate. He came to that conclusion after looking to the independent allowances for stocks, office furnishings, and expenditure on free fittings, and to the character of the business conducted by the Company, whose returns were largely derived from slot-meters, and were continuous in their nature. It had been argued for the Assessor that from the allowance of £1091 under the head of stocks a deduction should be made of £440, which was said to represent an emergency stock of coal. On the other hand, it was contended that the emergency stock of coal was a matter of prudent management in use; supplies might be cut off owing to a miners' strike. The Assessor's contention was that, owing to the substantial allowance for floating capital, the amount should be entirely disallowed, or, alternatively, it should be reduced to £200. If it were clearly demonstrated that the latter figure represented the amount of stock which the Company were in the habit of retaining under this head, his Lordship thought that would afford the best evidence of what should be allowed. The Valuation Committee, however, had taken the view that, in the circumstances of the case, £440 should be allowed; and he was not prepared to advise that the figure should be altered. The Committee had allowed, under the head of tenant's capital, a sum of £2812, which was described as free fittings. The fittings—internal piping in the houses of consumers from the meter to the burner, with brackets and sundries (exclusive of burners, mantles, and glassware) had been supplied at the cost of the Gas Company, free of charge to consumers. It was not the universal practice of gas companies to supply these fittings to consumers free of charge, but the appellants did so for the purpose of promoting the industry. According to the Assessor, no allowance should be made in respect of these fittings. This, he contended, was a principle laid down in the case of the Kirkcaldy Gas Light Company, in 1906. There the local Valuation Committee held that the Company were not entitled to any allowance for tenant's capital to cover the cost of meters and stoves. From an examination of the facts of the case, it appeared to him (Lord Hunter) that the most important point was in reference to the meters. The Court of Session held that the local Valuation Committee were wrong in not making allowance for the meters, but right so far as the stoves were concerned. In his written opinion, Lord Low said: "I think that the cost of cooking stoves may at once be set aside, because it is not necessary for the carrying-on of the business of making and supplying gas that the tenant should supply cooking stoves. That is a branch of the business that he might or might not find it expedient to carry on." This was a statement which he (Lord Hunter) did not think could now be treated as of general applicability to gas undertakings. So far as the present case was concerned, the opinion afforded no justification of the Assessor's contention. On the findings of the Committee, it was obvious that the Company would not receive the same revenue if they did not supply these fittings; and as it was not contended that they formed part of the heritable subjects of the undertaking, his Lordship thought the Committee were justified in treating their cost as part of tenant's capital. Under the heading of expenditure on services, &c., the Company claimed that a sum of £6330 should be treated as tenant's capital. The appellants in their pleadings said: "This sum represents the cost to the Company of buying and supplying piping from the main to the meter in the consumer's premises. The Company have laid and supplied that piping, and maintain it, as they supply and maintain meters, entirely free of charge to the consumer." It appeared to his Lordship that the piping so laid was heritable, and as such its annual value ought to enter the valuation roll. He was unable to accede to the contention of the appellants (the Company) that the piping and fittings being laid on the solum of properties occupied by consumers, and not belonging to the Company, must be treated as part of the movable property of the Company and part of the tenant's capital. This contention was rejected in the Falkirk case, where it was held that pipes laid along public highways and in the property of consumers were heritable subjects for which the Company were liable to assessment. The appellants (the Company) also asked that 10 p.ct. of revenue, or a sum of £2000, described as cash allowance for rates and taxes, &c., should be treated as tenant's capital. This claim was quite unmaintainable, and was rightly disallowed by the Valuation Committee. In regard to the rate of interest to be allowed on tenant's capital, the Company asked for 10 p.ct., while the Assessor argued that it should be 5 p.ct. On the other hand, the Valuation Committee had allowed 7 p.ct. In his Lordship's view, 5 p.ct. was still treated as the fair rate of interest allowed on money the payment of which was in arrear. He did not think, therefore, that sufficient justification had been made out in the present case for departing from what had been the usual and customary allowance. The Valuation Committee had fixed 20 p.ct. as the tenant's share of profits, and the appellants (the Company) had not shown any justification for increasing the allowance to 33⅓ p.ct. On the whole issue before the Court, he thought the Judges should adhere to the decision of the Valuation Committee upon all the points, with the exception of reverting to the well-recognized rate of 5 p.ct. on tenant's capital, instead of sanctioning the increased rate of 7 p.ct.

Lord ASHMORE, in concurring, dealt with the decision of the Valuation Committee in regard to tenant's capital—the claim for money expended in supplying and laying the pipes from the mains to the meters in the consumer's premises, and the further claim for five-twelfths of the total working expenditure in connection with the manufacture and distribution of gas. The outstanding consideration which the Valuation Committee had in view, and which seemed to his Lordship to justify their decision to allow one-third instead of five-twelfths, was the fact that the Company obtained from slot-meter collections a considerable revenue practically from week to week, representing in the best periods £450 to £500 a week. The development of the slot-meter system seemed to him to warrant the adoption, as had consistently been done for several years past, of a proportion of one-third, instead of five-twelfths, which at one time was regarded as reasonable. On the question of rate of interest, Lord Ashmore observed that Counsel for the Company were unable to cite any precedent whatever for an allowance of interest of more than 5 p.ct. on the tenant's capital in a case like this. In the Kirkcaldy case, 5 p.ct. was allowed, and Lord Low made the observation that it was the proper rate. In the course of the Coatbridge appeal in 1907, Lord Low referred to the allowance of 4½ p.ct. made for interest "as a rate which has frequently been recognized as reasonable." These decisions, and others like them, seemed to be inconsistent with the theory on which the Company were claiming 10 p.ct. in the present appeal. On a strict view of the evidence adduced, *prima facie* support was given for the Assessor's contention in respect of Directors' and Auditor's fees. On the other hand, the Valuation Committee were in a more favourable position than the Court of Session to form a satisfactory judgment, and his Lordship thought the decision they had given ought to be allowed to stand. On the question of free fittings, the evidence rather justified the view taken by the Valuation Committee that the expenditure in question was incurred by the Company as tenants in order to procure and promote the business of the undertaking. Moreover, the appellants secured an increased price for the gas in the case of consumers to whom free fittings had been supplied. It seemed to him reasonable therefore that the cost of supplying the free fittings should be included in the tenant's capital. The Valuation Committee's decision was really in accordance with, although it was in extension of, the principle given effect to in the Kirkcaldy appeal regarding the supply of meters. On

the whole, he was of opinion that the decision of the Valuation Committee ought to be affirmed, so far as the supply of free fittings was concerned.

Lord SANDS concurred in the opinions of Lords Hunter and Ashmore.

Metal Discs in Slot-Meter.

At the Pontefract Police Court on Thursday, a miner named Joe M. Woffenden, of Castleton, was charged with obtaining gas by trickery. It was alleged that defendant's slot meter contained 32 metal discs cut to the size of a shilling. The representative of the Featherstone Gas Company admitted that proceedings had been delayed in order to give defendant an opportunity of redeeming the discs; and if the money was now paid, he would be willing to withdraw the charge. On the ground that the prosecutors had compounded a felony by offering to accept payment, the magistrates dismissed the case.

Claim against a Prepayment Consumer.

At the Stow-on-the-Wold County Court, Messrs. James Robertson Duff and William Robert Day, trading as the Bourton-on-the-Water Gas Company, sued Mr. E. R. Stone for £1 4s. 6d. for gas consumed through a prepayment meter. Mr. Whitehorn appeared for the plaintiffs, and Mr. Selman for the defendant. Mr. Selman said the plaintiffs alleged that the money in the meter was not sufficient to pay for the gas consumed. Defendant contended that the meter had gone wrong before, and that he had had no gas he had not paid for. The meter was unreliable. Mr. Whitehorn said the Company had had the meter tested, and it was perfectly accurate. They also raised the question that the meter had been tampered with. Mr. Selman remarked that plaintiffs had written a letter to defendant suggesting that he interfered with the meter intentionally. His Honour Judge Alan Macpherson said the letter was non-committal. The Company did not think it was done fraudulently, and they did not impute dishonesty to defendant. His Honour suggested that now this had been made plain he did not think there was any substantial difference between the parties, and thought they might come to a settlement. The defendant agreed to judgment against him for the amount claimed, and £4 4s. costs. Judgment was entered accordingly.

Flat-Flame Tests for Information.

The London Gas Act, 1905, enables the London County Council to require tests to be made for ascertaining the sulphur content of gas, and also its illuminating power when burnt in a flat-flame burner; such tests, however, being for purposes of information only. The methods and apparatus used were prescribed by the Metropolitan Gas Referees. With the passing of the Gas Regulation Act, 1920, the functions of the Metropolitan Gas Referees expired, and consequently no means now exist for giving effect to the above-mentioned provisions of the Act of 1905. The Gas Regulation Act makes no mention of the tests in question, and the Board of Trade hold that they have no power to make any requirements in the matter. Pending the decision of the Board of Trade, which was received on Aug. 21, 1923, the tests were continued at such testing places as have been equipped with the necessary apparatus; but when alterations are made either in the position or the equipment of testing places, the apparatus for making these tests is being removed. The tests for illuminating power are no longer needed; but the tests for sulphur still retain their value for purposes of information, although the gas companies can no longer be required to supply and maintain the apparatus. In view of these considerations, the Public Control Committee of the Council have decided to discontinue forthwith the testing of gas for ascertaining its illuminating power when burnt in a flat-flame burner, and to continue the tests for ascertaining the sulphur content of gas only at such testing places as may be equipped with the necessary apparatus.

Harpenden Gas Company's Powers.

At last week's meeting of the Hertfordshire County Council, the Parliamentary Committee reported on certain matters affecting the Harpenden District Gas Company. The Company, the Committee stated, had mad eapplication to the Board of Trade for a Special Order under section 10 of the Gas Regulation Act, to enable them to purchase certain lands on the northern side of the existing gas lands of the Company, on which to erect further gas-works; to repeal the provisions of the Harpenden District Gas Act, 1901, the Harpenden District Gas (Charges) Order, 1921, and the Harpenden District Gas Order, 1921, which relate to the price of gas supplied by the Company, and the sliding-scale affecting their dividends; and to consolidate and re-enact those provisions with such modifications as might be necessary or desirable. In December, 1920, the Company applied for an Order under section 1 of the Gas Regulation Act for power to substitute a new standard price of 18d. per therm in place of their existing standard price of 4s. 9d. per 1000 c.ft. On that occasion it was considered that a price of 16·6d. per therm was the highest which could be justified; but the Board of Trade fixed the new standard price at 17·4d. per therm. The County Accountant considered the draft Special Order, and, having regard to his report thereon, objections have been lodged with the Board of Trade on behalf of the Hertfordshire County Council, suggesting that the time has now come when the therm price granted in 1921 should be reviewed, and also that the Company should not be given power to create a renewal fund, as they are seeking to apply revenue to the extent of 1 p.ct. of the paid-up capital of the Company, in addition to the 1 p.ct. which they are entitled to apply out of revenue towards similar purposes to be set aside for renewal. The Harpenden Urban District Council have also objected to the standard price being re-enacted at 17·4d. per therm, and have suggested to the Board of Trade a standard price of 15d. per therm. It is hoped to be able to arrange a meeting with the promoters and other parties concerned, in order to see whether a settlement can be arrived at.

MISCELLANEOUS NEWS.

METROPOLITAN GAS COMPANIES' OFFICIAL TESTINGS.

The reports of the Gas Referees of the official testings for the past quarter under the provisions of the Gas Regulation Act give the following average calorific values for the gas supplied by the Metropolitan Companies named.

Brentford Gas Company.—506·1 B.Th.U. (declared calorific value, 500 B.Th.U.).

Commercial Gas Company.—480·9 B.Th.U. (declared calorific value, 475 B.Th.U.).

Gas Light and Coke Company.—501·6 B.Th.U. (declared calorific value, 500 B.Th.U.). Sulphuretted hydrogen was found on one day at the testing place at Canning Town. The Chief Gas Examiner has decided in regard to this case that "the default of the undertakers was not substantial, and was not due to the careless conduct of the undertakers or their servants, and I determine that no forfeiture be incurred by the undertakers in respect of such default."

South Metropolitan Gas Company.—564·4 B.Th.U. (declared calorific value, 560 B.Th.U.).

South Suburban Gas Company.—487·1 B.Th.U. (declared calorific value, 480 B.Th.U.). Sulphuretted hydrogen was found on one day at the testing place at the Erith gasholder station.

Wandsworth, Wimbledon, and Epsom District Gas Company.—475·4 B.Th.U. (declared calorific value, 470 B.Th.U.).

BRENTFORD GAS COMPANY.

Report of the Directors.

The Directors of the Company (the Chairman of which is Mr. Reginald J. N. Neville) will report as follows, for the year ended Dec. 31, at the annual meeting next Wednesday.

The accounts show a profit of £206,959 on the revenue account for the year. After providing for the interim dividend to June 30, and fixed charges, and after placing £19,916 to the special purposes fund, there remains the sum of £75,980, which, with the balance brought forward, makes the amount of £125,464 available for dividends. The Directors recommend the declaration of dividends, subject to income-tax, at the rates of 5 p.ct. per annum on the 5 p.ct. preference stock, £6 2s. p.ct. per annum on the "A" consolidated stock, and £6 2s. 6d. p.ct. per annum on the "B" consolidated stock; and that such dividends be payable on March 1.

Two reductions in the price of gas have been made since last year—a reduction of four-fifths of a penny per therm as from the Midsummer quarter, 1923, and a reduction of two-fifths of a penny per therm as from the September quarter, 1923. The gas sold shows an increase of 8·57 p.ct. as compared with last year. The number of consumers is 132,159, as against 128,837 last year, and the stoves and other apparatus sold and let out on hire have increased by 9970.

The application for an Order under section 10 of the Gas Regulation Act, 1920, enabling the Company to take over the undertakings of the Harrow and Richmond Gas Companies, which was sanctioned by the proprietors at an extraordinary meeting held on May 25, 1923, has been proceeded with. A public inquiry was held by the Board of Trade in October last, and it is expected that the Order will be submitted for the approval of Parliament in the near future.

In accordance with the Act of Parliament, Sir Robert Shafto Adair, Bart., and Dr. Thomas Ethelbert Page, by rotation, retire from the Board, and, being eligible, offer themselves for re-election. Mr. Monier F. Monier-Williams, and Mr. Alfred Bevis, the Company's Auditors, offer themselves for re-election.

SOUTH SUBURBAN GAS COMPANY.

Annual Report.

In submitting the accounts for the year ended Dec. 31 to the annual meeting of the Company next Friday, the Directors will present the following report, signed by the Chairman (Mr. Charles Hunt).

The price of gas was reduced by the Company twice during the year; it being now 9½d. per therm, or 3s. 11·04d. per 1000 c.ft. The sales of gas have increased by 5·14 p.ct., as compared with the year 1922; while the number of consumers has increased by 2040, and of cookers, gas-fires, &c., on hire by 2697, in addition to which 1766 of these appliances were sold to consumers.

The accounts show that, after providing for all debenture and other interest charges, and payment for the first half of the year of a statutory dividend at the rate of 6 p.ct. per annum, less income-tax, there remains a balance of £46,871, out of which the Directors recommend payment for the second half-year of a dividend at the rate of 6½ p.ct. per annum, less income-tax. To the reserve fund has been restored the sum of £2921 drawn from it during the war period, and a contribution of £7900 has been made to the special purposes fund, leaving the sum of £696 to be carried forward to next account. The bonus for the year payable to co-partners, based on their earnings, is 4½ p.ct.

The Directors retiring by rotation are Mr. Benjamin R. Green and Mr. Harold Gundry, who, being eligible, offer themselves for re-election. Mr. Edward P. Norton, Employees' Director, has been re-elected by a majority of votes. Mr. Alfred Morland (Auditor) retires by rotation, and, being eligible, offers himself for re-election.

Price of Gas at Stockton.—To the Stockton-on-Tees Corporation on Tuesday of last week, the Gas Committee reported that, in view of a recent reduction in the price of gas to outside districts, no sufficient reason had been shown for any further concession at present.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" with regard to applications to the Board of Trade for Orders under the Gas Regulation Act.

Borough of Colne.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 4d. per therm.

It is also proposed that an additional charge of 2d. per therm should be authorized in respect of gas supplied through a prepayment meter.

DECLARATION OF CALORIFIC VALUE.

Tamworth Gas Light and Coke Company.—450 B.Th.U. (March 31.)

STANDARD GAS PRICES IN LONDON.

There was submitted at this week's meeting of the London County Council a lengthy report by the Public Control Committee on the report of the Departmental Committee on the Thermal Basis of Charge. They deal with the evidence given on behalf of the Council and the Departmental Committee's conclusions, and express the opinion that the inquiry has served a useful purpose in presenting to the public a clear statement of the reasons for the change in the basis of the charge for gas, in making it quite apparent that the change in question was not responsible for the increased charges which gas consumers were called upon to meet, and in bringing to the notice of the companies the desirability of making clear to the consumers the relation of the new system of charge to the old basis.

Another section of the report relates to the reduction of the standard price of the Gas Light and Coke Company following upon a public inquiry by the Board of Trade held as the result of an application by the Council. The evidence is reviewed, and allusion is made to the decision of the Board reducing the standard price of the Company to 11d. a therm. As to this, the Public Control Committee say: "With the present actual price of 8·6d. a therm, the dividend which the Company would have been entitled to declare (after allowing for the statutory contribution to sinking fund) in relation to the old standard price of 15·2d. a therm, would have been at a rate higher by £2 16s. p.ct. per annum than the rate of dividend correspondingly calculated in relation to the standard price of 11d. a therm now fixed by the Board of Trade. This difference represents an amount which is equivalent to about 0·7d. a therm (or 3½d. per 1000 c.ft.). This figure represents the saving which is secured to the consumer by the reduction of the standard price, though it needs to be added that the Company have already conceded this saving to the consumer by voluntarily restricting their dividends. . . . The principal advantage from the consumers' point of view of a reduction in the standard price is that it makes the sliding scale fully effective, and thus provides a powerful incentive to the Company to effect economies and increase their business, since every reduction in price of 1d. a therm entitles the Company to declare an additional dividend of 13s. 4d. p.ct. on their 4 p.ct. stock. The substantial reduction in the standard price supplies ample justification (if such were needed) of the action taken by the Council on behalf of London gas consumers."

On Nov. 6 last, the London County Council decided to make a similar application to the Board of Trade in respect of a revision of the standard price applicable to the Commercial Gas Company; and it is anticipated that an inquiry into the matter will be held in the near future. As to the South Metropolitan (the second largest of the London Gas Companies) that Company are not at present subject to the Gas Regulation Act, 1920, as regards standard price; but an opportunity for revision of the standard price must be given by the Company not later than the parliamentary session of 1925.

The Public Control Committee still have under consideration the question of the action to be taken with a view to securing a revision of the standard price applicable to the three remaining Companies supplying gas in the London area—viz., the Brentford Gas Company, the South Suburban Gas Company, and the Wandsworth, Wimbledon, and Epsom District Gas Company.

Whitworth Vale Gas Company.—The revenue account for the half-year ended Dec. 31 showed a profit of £788, and there was a disposable balance of £720. Out of this the Directors recommended, at the meeting last Thursday week, a dividend of 7 p.ct. per annum on the original shares, and of 5 p.ct. per annum on the "B" shares, less income-tax.

Cambridge University and Town Gas Light Company.—The reduction in the price of coal and other costs of manufacture enabled the Directors to reduce the price of gas as from Midsummer last from 9d. to 8½d. per therm, and also to make a further reduction as from Christmas to 8d. (equivalent to 3s. 2d. per 1000 c.ft.). The payment of dividends at the usual rates is recommended.

Underground London.—At the invitation of Mr. W. W. Townsend, Engineer and General Manager of the Colchester Gas-Works, who is also the Programme Chairman of the Colchester Rotary Club, Mr. W. J. Liberty yesterday week gave an illustrated lantern lecture on "Underground London" before a special meeting of the Club, following a dinner. Mr. Liberty gave a description of underground London from the Roman times, dealing with hidden rivers, springs, and spas, the earliest underground steam railways, the subterranean streets of the Metropolis, the network of sewers, the now familiar electric tube railways, and the mass of mains, pipes, and culverts. He dealt with the obstacles and dangers attending the laying of mains and pipes under roads carrying the enormous weights of mechanically propelled vehicles. He also referred to the recent tube collapse in South London, illustrating the accident by lantern slides.

THE ECONOMICAL USE OF GAS.

Mr. G. Dixon, Gas Engineer to the Lancaster Corporation, lectured on Tuesday night, Feb. 5, to the members of the Lancaster Trades Council, on "The Economical Use of Gas." A great many questions followed the lecture.

Mr. Dixon began with the statement that the use of gas in this country was growing by leaps and bounds. Not only industrially, but domestically, had the country recognized the value of gas and its cleanliness in comparison with raw coal. He divided his topic under two headings—domestic and national economy. The chief points on the importance of domestic economy were:

(1) There must be a supply of good quality gas, which Parliamentary action assured.
(2) Sufficient pressure to ensure adequate supply.
(3) A good and accurate meter.
(4) Efficient works properly managed, so that gas could be produced as cheaply as possible.
(5) An obliging distribution staff, to get in touch with consumers and offer them advice regarding the uses of gas.
(6) Efficient showrooms, so that appliances could be inspected and hired at a cheap rate.
(7) Profit made by the department to go to the consumers who created it—by reduction in the price of gas.

Consumers must use only approved and reliable burners. A flat flame cost twenty times more than did the same light given by an incandescent burner. It was necessary to have the right burner or appliance for the job. Coloured globes took away a large proportion of light; and he advocated clear globes, white or nearly white. It was important, too, that they should have the globe near enough to the mantle to prevent a large volume of air circulating round it and carrying off the heat. Silica globes would not crack, and could therefore be placed closer to the mantle. Though dearer at first, they saved much in mantles, and added to efficiency in light.

The correct use of gas-appliances should be taught, and no school should be without its class for this purpose. Everyone should learn how to use gas most effectively, and there should be free maintenance of burners and fittings by all gas undertakings. If this were done, they would hear no more of "bad gas," and there would be a tremendous saving in the bills of householders. He hoped shortly to establish a room where consumers could test appliances.

Mr. Dixon devoted the second portion of his address to national economy, contending that with limited coal resources everyone should try to use the coal so as to secure the greatest efficiency. The burning of crude coal simply meant pollution and waste; but by the manufacture of gas, coke, and bye-products, they were contributing to the wealth of the nation and its general efficiency.

BUSINESS EFFICIENCY EXHIBITION.

Scientific business organization becomes day by day more necessary, and the means available for bringing it about are being continually added to. The truth of the former statement must be apparent to every business man, while of the truth of the latter anyone can assure himself by visiting, between now and the 16th inst., the Central Hall, Westminster, where (under the auspices of the Office Appliance Trades Association) the fifth post-war Business Efficiency Exhibition is taking place. While it is impossible to refer in detail here to the exhibits—which are, generally speaking, applicable to all commercial undertakings—it may be said that there is gathered together an astonishing variety of wonderful ideas and appliances well calculated to achieve the aims of the organizers.

Among the principal exhibits are book-keeping machines which typewrite and print figures on invoices, day books, ledgers, statements, bank paying-in slips—adding-up amounts, showing totals, presenting perpetual balances, and making book-keeping speedy and exact. The adding and calculating machines to be seen will do any arithmetical work far more accurately and far quicker than the most skilled human brain. Machines are made which enable dictation to be done without the intervention of shorthand. There are, of course, typewriters and loose-leaf books of many different patterns. A cheque writer and protector writes amounts in indelible and unalterable characters; and addressing machines will address envelopes, newspaper wrappers, pay rolls, dividend warrants, &c., in facsimile typewritten characters, at the rate of 1000 to 10,000 (according to the size of the machine) per hour. There are accounting and tabulating machines for producing statistics exactly and quickly. These are worked on the punched-card principle, like a jacquard loom. Statistics from unit cards can be obtained in printed form at the rate of 18,000 per hour. On view also is a postal franking machine which automatically feeds, seals, stamps, stacks, and counts outgoing mails in one operation, at the rate of 250 a minute. The automatic cashier pays-out money correctly at the touch of a button. Included in the time-recorder section is the Gledhill-Brook automatic portable recorder for time-recording and costing. This model has been designed to replace time stamps; and its moderate cost brings it within the reach of the smallest employer of labour.

Bath Gas Light and Coke Company.—The report for the past year states that the income from the sales of residuals has been very good, and has materially contributed to the satisfactory state of the accounts. The price of gas was again reduced from the end of the September quarter by ½d. per therm, making the present price 5d. per therm (2s. per 1000 c.ft.). In view of the large amount of unemployment in the country, the Directors have decided actively to push forward extensions to the works and mains, which are essential to meet the future requirements of the undertaking, but which under normal conditions would possibly not have been taken in hand for some time. An interim maximum dividend of 5 p.ct. per annum, less income-tax, was paid for the half-year to June 30; and the Directors recommend a dividend at the same rate, less tax, for the second half of the year.

THE NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

Apart from coking coals, for which the demand appears to have fallen right off, the market has displayed considerable strength during the past week. All round inquiry for both prompt and forward encourages collieries and holders of coal to stand out for firm prices; and fear of dock trouble, which would, of course, dislocate coal shipments, has sustained the pressure on the part of consumers for full deliveries of contract quantities.

Gas coal has been a feature of the week; and as a result of persistent demand, Wear specials and best qualities (Holmside, Boldon, New Pelton class) are quoting strongly at 25s. to 25s. 6d. f.o.b., while seconds have hardened up to 24s., and are in some cases asking 24s. 6d.

One of the big London companies is reported to be beginning to "feel its way" towards new contracts. It is never easy to get accurate information in these cases, but the general market idea is that they will be able to buy second qualities at an average price round about 23s. f.o.b. This is, of course, below the current quotation mentioned above; but regular customers for long periods and large quantities are naturally on a different basis to speculative contractors or would-be buyers of odd cargoes. This must always be borne in mind when studying "current quotations" in coal trade reports.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

The market is rather excited in view of a possible dockers' and miners' strike. House coals are not in urgent demand; but there seem to be plenty of orders to cover the requirements of the collieries at the moment.

Gas coals are rather scarce. There appears to be a considerable improvement in respect of industrial fuels.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

Prices have subsided again since the hectic period of the railway strike. On an average, however, buyers have to pay about 1s. per ton above the rates ruling prior to the upheaval. Though conditions have greatly improved, the distortion of the distributive system is by no means a thing of the past. Progress is being made with the task of redressing the deficiency of supplies in the southern area. Wagons which had got off their usual beats are being gradually replaced. Districts in the Midlands that were not reduced to such straits as some others are carrying on as far as practicable out of stocks till dislocations are overcome.

In the case of gas coal the situation is no longer acute; but inquirers will not be easy in their minds till reserves have been strengthened. Some of them are still working on an uncomfortably slender margin.

There is no longer any tension in the house coal trade. Consumers in the Birmingham zone have relatively good supplies laid in, and there is no sign of stringency, notwithstanding the large diversion of the district output to less favourably circumstanced parts of the country.

Industrialists are getting deliveries as they require them. Owing to the conditions which have ruled, they have to make so large a proportion of their purchases on the open market at current rates that the effect on production costs is appreciable, particularly in the iron and steel trades, where the encroachments of foreign competition are increasingly felt.

The scarcity of gas coke aggravates the shortage of blast-furnace coke, and the advance of prices causes grave anxiety. An offer of 30s. at ovens for quick delivery of furnace coke circulated last week elicited no response. The market level has dropped about half-a-crown below that figure, however, where reasonable conditions of delivery can be arranged.

Harpenden Gas Capital Issue.—As announced in our advertising columns, Messrs. A. & W. Richards, of No. 37, Walbrook, E.C., have been instructed by the Directors of the Harpenden District Gas Company to offer for sale by tender £7000 of additional capital stock, ranking for a standard dividend of 6 p.ct., subject to the sliding-scale, equally with the existing similar stock, on which the last dividend paid was £7 8s. p.ct. The minimum price for tenders is £105 per £100 of stock. The capital is required to meet rapidly growing demands for gas. Tenders must be sent in not later than 11 o'clock on Friday, Feb. 29.

Weymouth Consumers' Gas Company.—The half-yearly meeting of the Company is to be held to-morrow (Feb. 14), when the Directors will submit the accounts for the six months to Dec. 31, which record steady and satisfactory progress of the business. The quantity of gas sold was 465,675 therms, equal to 101,233,700 c.ft. This is the first half-year in the history of the Company in which the output has exceeded 100 million c.ft. The increase upon the second half of the year 1922 is 13,722 therms, or 2,983,200 c.ft., equal to 3·03 p.ct. During the whole of the corresponding half-year of 1922, the price charged for gas was 11d. per therm; but from July 1 to Sept. 30, 1923, the price was at the lower rate of 10½d. per therm, and from Oct. 1 to Dec. 31, 1923, a further reduction of ½d. per therm was in force—lowering the cost to 10d. per therm (only 27½ p.ct. above pre-war price), at which rate it now stands. After providing for the interest on the debenture stock, the balance at the credit of the net revenue account is £11,165, out of which the Directors recommend payment of a dividend on the ordinary stock at the maximum rate of 5 p.ct. per annum, less income-tax. For the whole of the year 1923, the output of gas was 887,634 therms, equal to 192,964,100 c.ft.; the increase upon the year 1922 being 2·18 p.ct.

TRADE NOTES.

Messrs. Guy F. Dowding and Co.

Messrs. Guy F. Dowding and Co., engineers, of Morning Post Building, Strand, W.C., have been appointed sole agents for Great Britain and the Dominions for the Montbard-Aulnoye Tube Works, Paris, the oldest established manufacturers in France of solid-drawn steel tubes up to 6 in. diameter, which they make to B.S.S. No. 53 (for locomotive tubes). With this firm is associated the Solesmes Tube Works, whose production is confined to butt and lap welded tubes up to 12 in. diameter, for gas, water, and steam.

A Welsbach Lighthouse.

A very neat copper ashtray, with a silvered model of a lighthouse in the centre, has been received from the Welsbach Company. It is both attractive and useful; and it serves as a reminder of the famous Welsbach lighthouse poster. We understand that practically every gas manager and engineer throughout the United Kingdom has received one of these ashtrays; also the principal wholesale and retail customers of the Company.

"Purifiers."

This is the title of a well-prepared leaflet recently published by Messrs. Drakes, Ltd., of Halifax. In this it is pointed out that the consistent satisfaction associated with the purifiers made by the firm is the result of the excellent quality of the materials used, and the thoroughness of the workmanship in every detail of the boxes, covers, valves, and structure.

Gas Affairs at Marsden.—The Marsden District Council last week decided on a reduction in the price of gas by 5d. per 1000 c.ft., to date from Jan. 1. An exhibition of lighting, heating, and cooking appliances is being held at the Marsden Mechanics' Institute, with cookery and other lectures and demonstrations by Miss H. H. Tuxford, of the South Manchester School of Cookery. In addition to the Council's own displays, there are exhibits by Messrs. R. & A. Main (cookers, fires, &c.); the Welsbach Light Company (burners, lamps, shades, &c.); the National Gas Engine Company (gas plant for power); and Messrs. Staniforth (indoor lighting equipment).

Dorchester Gas and Coke Company, Ltd.—The sound condition of the Company's business is reflected in the accounts for the year ended Dec. 31, which enable the Directors to recommend a final dividend of 10 p.ct. on the ordinary capital and 6 p.ct. on the preference capital, both less income-tax. On Oct. 1 last the Directors reduced the price of gas from 5s. 3d. to 4s. 10½d. per 1000 c.ft. (representing a concession of 1d. per therm), and they hope to make a further reduction in the near future. In the case of the Dorchester Gasfitting Company, Ltd., a dividend of 6d. per 10s. share (7s. paid up) is recommended, with an unappropriated balance of £666 carried forward.

Fatal Accident at the Bolton Gas-Works.—The Bolton Coroner held an inquest, last Wednesday, on J. M'Intyre, foreman gas stoker, employed by the Bolton Gas Department, who died following an accident on Jan. 22. J. E. Hindle, an electrician, described how he and deceased attended to the lights in the coal-crushing pit. Later, another employee told deceased the lights in the pit were still out. Both men went to investigate. As they were approaching the pit deceased fell in. With assistance he was hauled up and taken to the infirmary, suffering from a fracture of the spine, partial paralysis of the legs, and injuries to the kidneys. Witnesses were questioned as to the lighting in the pit and the means of protection when the trap-door was open. They agreed that on the side on which the door opened there was nothing to prevent anyone falling into the pit. This defect had since been remedied. The Coroner in returning a verdict of "accidental death" suggested that the Corporation should place an extra light above the pit. An undertaking was given that this would be done.

Bristol Gas Company and Geyser Fitting.—The Bristol Gas Company have addressed a letter to the Medical Officer of Health, the City Sanitary Authorities, the Coroner, the local Master Plumbers' Association, and the Bristol Association of Building Trades Employers, recommending that a strong line of action should be taken by all concerned in connection with the installation of geysers. The Company urge that if it is impracticable to fix the apparatus efficiently, with satisfactory means of carrying away the products of combustion, a geyser should not be installed. All responsible firms should do everything possible to stamp out once and for all the dangerous practice of fixing geysers without flues. When firms are called in to repair a geyser fixed without a flue, or with an inadequate or defective flue, they should strongly warn the consumer, and insist upon the imperative need of satisfactory and adequate means of carrying away the products of combustion. In the event of a consumer refusing permission to fix a flue, the contractor is invited to communicate with the Gas Company, who will exercise their influence in such cases.

Tottenham District Light, Heat, and Power Company.—The accounts for the year ended Dec. 31, which will be submitted at the annual meeting next Tuesday (Feb. 19), show, after payment of dividends in respect of the half-year ended June 30 at the rate of 5 p.ct. per annum on the preference stock, 8 p.ct. per annum on the "A" stock, and 6½ p.ct. per annum on the "B" stock, all less income-tax, and providing for interest and other charges, an available balance (including a sum of £39,288 brought forward from the last account) of £69,940. The Directors recommend the confirmation of the above-mentioned dividends, and the payment of dividends, in respect of the half-year ended Dec. 31, at the rate of 5 p.ct. per annum on the preference stock, 8 p.ct. per annum on the "A" stock, and 6½ p.ct. per annum on the "B" stock, all less income-tax. In June last, an issue of £100,000 "B" consolidated stock was made at an average price of £104 0s. 8d. per £100 of stock, with the result that a premium of £4034 3s. 9d. was obtained. A gasholder of a capacity of 7 million c.ft., erected at the Tottenham Works, was brought into use on Dec. 20.

CURRENT SALES OF GAS PRODUCTS.

Tar Products in the Provinces.

Feb. 11.

There has been a further heavy fall in the price of pitch during the past week, and business is now reported to have been done in South Wales at 57s. 6d. delivered. There is very little inquiry from the Continent, and it would appear as though Continental demand is being met largely from Belgian and German production. Creosote is very quiet. There is still a fair demand for export; but prices at makers' works are decidedly lower. Water-white products are somewhat better, by reason, of course, of the rise which has taken place in petrol. Carbolic acid is still very dull, and crystals are extremely difficult to sell, even at to-day's low prices. Naphthalene is very quiet and extremely difficult to sell.

The average values for gas-works products during last week were: Gas-works coal tar, 45s. to 50s. Pitch, East Coast, 50s. to 52s. 6d. f.o.b. West Coast—Manchester, 47s. 6d. to 50s.; Liverpool, 48s. 6d. to 51s.; Clyde, 49s. 6d. to 52s. Benzole 90 p.ct., North, 1s. 4½d. to 1s. 5d.; crude 65 p.ct. at 120° C., 9½d. to 10d. naked at makers' works; 50-90 p.ct., naked, North, 1s 9d. to 1s. 11d. Toluole, naked, North, 1s. 4d. to 1s. 5d., nominal. Coal tar crude naphtha in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 11d. to 1s. 1d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, liquid, 8¼d. to 8½d.; salty, 8d. to 8¼d.; Scotland, 7¾d. to 8d. Heavy oils, in bulk, North, 9d. to 9¼d. Carbolic acid, 60 p.ct., 2s. 1½d. to 2s. 4½d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

Price of 90 p.ct. Benzole.

Two or three correspondents have written to us regarding the price quoted last week for 90 p.ct. benzole. A sample letter is as follows: "It appears to us that there is a misprint in the quotations of your current issue; the price for 90 p.ct. benzole in the North having been increased by 4½d. per gallon, instead of 4d. per gallon, which is the actual increase in the wholesale price of No. 1 motor spirit. On the basis of your previous quotation, the new figure should average 1s. 4⅝d." [The attention of our market correspondent has been called to this matter.—ED. G.J.]

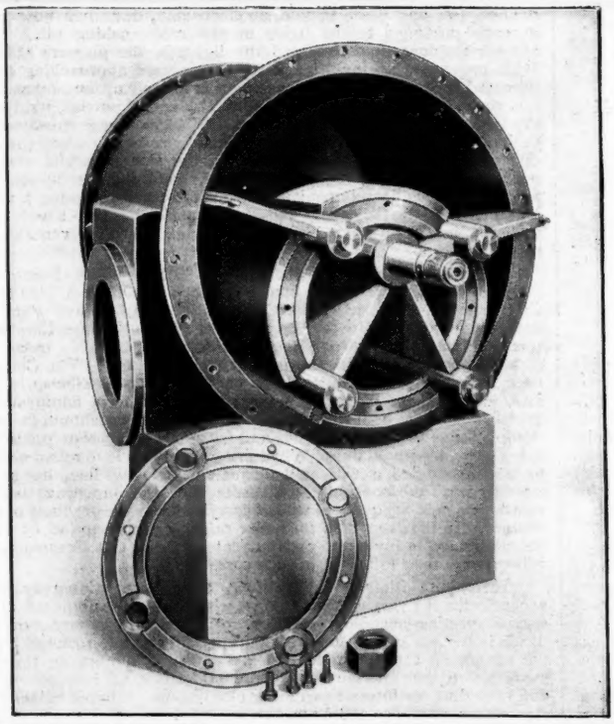
An estimate of £10,000 for the provision of additional purifying plant at the Greenbank Gas-Works of the Blackburn Corporation has been approved, together with an estimate of £2000 for a naphthalene washing plant, and one of £2000 for additional coke crushing and screening plant. At the Council meeting, on Feb. 7, it was decided to obtain tenders for the work.

Chemical Trade in the United States.

There is in the January issue of "Industrial and Engineering Chemistry" an analysis by Mr. C. R. De Long, of Washington, of the import and export trade statistics of the United States in chemicals and allied products for the first nine months of 1923. Comparison is made by him with the corresponding period of 1922 (the nine months preceding the passing of the Tariff Act of that year), and with the pre-war year of 1913. The import and export trade in chemicals and allied products for the first nine months of 1923 practically balanced—exports exceeding imports by only $2,500,000, or less than 3 p.ct. Both imports and exports show a marked increase over the corresponding period of 1922; the increase in imports being entirely in the group of chemicals and allied products exempt from duty, and amounting to nearly $22,000,000. The import of all coal-tar chemicals increased 50 p.ct. in 1923 as compared with 1922, a fact largely accounted for by greater imports of creosote oil. In 1923 creosote oil represented 87 p.ct. of the importation of coal-tar crude products, and 58 p.ct. of all coal-tar chemicals. Prior to the war, the bulk of imports were dyes and other finished coal-tar products. The importation of dyes and other finished coal-tar products during 1923 under the Tariff Act already mentioned, was less than for the corresponding period in 1922. The export of coal-tar products was about 70 p.ct. greater than in 1922. The principal increases were $2,200,000 in the exports of benzole, crude tar, and pitch, and $1,500,000 in the exportation of dyes. The exports of dyes and finished coal-tar products in 1923 were in excess of the imports. This increase in the exports of dyes last year may be attributed to the interference with exports of German dyes caused by the occupation of the Ruhr. Although imports are slightly in excess of exports, the trade balance in coal-tar chemicals is much more favourable than before the war, when the United States not only had no export trade, but depended almost entirely upon imports.

New Company.—Messrs. Parkinson and Cowan (Australasia) is a recent registration, with a capital of £200,000, to acquire from Messrs. Parkinson and W. & B. Cowan, Ltd., the Australasian branch of that Company, and to carry on the business of manufacturers of stoves, ranges, lamps, and meters. The Directors are: Sir Henry Cowan, M.P., and Messrs. F. R Smith, W. W. Parkinson, J. A. Macleod, and F. Thorp. Address, No. 11, Fitzalan Street, Kennington Road, London, S.E.

Newmarket Gas Company.—The working of the Company for the past twelve months has resulted in a profit of £6628. With the sum brought forward, there is a balance at credit of profit and loss account of £11,757. The Directors recommend that out of this amount a dividend be paid at the rate of 7½ p.ct. for the year, less income-tax, upon the original consolidated stock, leaving £8297 to be carried forward. The price charged for gas during the year was 1s. 1d. per therm, but it has now been reduced to 1s.



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STOCK MARKET REPORT.

ALTHOUGH there was a firm opening in most of the markets on the Stock Exchange last week, the nervousness of investors, which is so obvious in the conditions prevailing at the present time, brought about a rapid reaction in prices. This reaction is attributed to various causes—the disclosures in connection with the alleged secret compact at Versailles and the decision of the Minister of Health with regard to the Poor Law relief at Poplar being two of the reasons advanced. Viewed at this date one is surprised that such rumours should affect the markets; but whatever the cause, profits have been, or will be, made by some operators thereby. A steadier tone prevailed at the end of the week; but the recovery in no way compensated for the loss. The 5 p.ct. War Loan is again below par, Funding Loan closed at 86⅝, and Local Loans at 64. Home Rails failed to maintain an early recovery, and Industrials were fairly buoyant.

As anticipated last week, the reports of gas companies continue to show very successful results for the past year. The business done at an improved price last week in Imperial Continental ordinary was probably in anticipation of the announcement that there would be another special distribution in respect of the outstanding balance of its German claim. This is the third instalment (amounting to £188,900), and will permit of a distribution at the rate of 10 p.ct. The necessary resolution will be submitted at a general meeting to be held in May. As a result the stock advanced 8 points, to 144-149. Other variations were: Aldershot 5 p.ct. and 4 p.ct. preference both fell 2 points, to 70 75 *ex* div. and 68-73 *ex* div. respectively; British "A" rose 2, to 117-122; European dropped ½, to 6½-7½; Gas Light ordinary fell 3, to 92 94 *ex* div., 3½ p.ct. maximum 1, to 61-64 *ex* div., and 4 p.ct. preference 2 points, to 76 79 *ex* div. Imperial Continental 3½ p.ct. debenture fell 2 points, to 72 75 *ex* div.

The following transactions were recorded during the week: On Monday, Alliance and Dublin 69½, Bombay 5⅛, Brighton and Hove 176, Bristol 5 p.ct. maximum 91, 91½, British 117, Cape Town 4½ p.ct. preference 6⅜, Commercial 4 p.ct. 93½, 95, 3½ p.ct. 93, 3 p.ct. debenture 56, Gas Light and Coke 95½, 95¼, 95⅜, 96, 3½ p.ct. maximum 62⅝, 63⅛, 3 p.ct. debenture 58¼, 59, 60, Imperial Continental 140, 145, 147, Liverpool 7 p.ct. preference 106½, Newcastle 3½ p.ct. 83¾, 85¼, Primitiva 7s. 3d., 8s., 5 p.ct. preference 30s., South Metropolitan 97, South Suburban 5 p.ct. 99, 5 p.ct. debenture 97½, Wandsworth (Wimbledon) 110. Supplementary prices, Ottoman 7 p.ct. preference 30s. 6d. On Tuesday, Gas Light 94⅜, 95, 95⅛, 95¼, 95⅜, 3 p.ct. debenture 58⅜, Imperial Continental 145, 146, 146½, 147, 147⅜, 148, 149, Primitiva 7s. 6d., 5 p.ct. preference 30s. 6d., 31s., South Metropolitan 97, 3 p.ct. debenture 59, 6½ p.ct. debenture 103⅜, 103⅝, South Suburban 5 p.ct. debenture 97½, Tottenham 4 p.ct. debenture 80, Wandsworth "B" 110. Supplementary prices, Croydon 6 p.ct. debenture 99½, 100, Hampton Court 5 p.ct. 107. Wednesday, Brentford "A" 99, "B" 99, Croydon 103, European 6⅜ *ex* div., Gas Light and Coke 95, 95¼, 95½, 3½ p.ct. maximum 62½, 4 p.ct. preference 77¾, 3 p.ct. debenture 58, 58⅛, 59½, 59⅜, Imperial Continental 146½, 147½, 148½, Primitiva 5 p.ct. preference 31s. 3d., 31s. 6d., 31s. 9d., 32s., South Metropolitan 96⅛, 96¼, 96⅜, 96⅞, 97, 6½ p.ct. debenture 103⅛, Wandsworth (Wimbledon) 107. Supplementary prices, Liverpool 5 p.ct. 89⅛, 89⅜. On Thursday, European 6½, 6¾, 6⅞, Gas Light and Coke 92½, 93, 95¼ *ex* div., 4 p.ct. preference 77 *ex* div., 3 p.ct. debenture 58½, Imperial Continental 146½, Primitiva 7s. 6d., 7s. 7½d., 5 p.ct. preference 31s., 31s. 3d., South Metropolitan 96½, 96¼, 96⅜, 97⅛, 6½ p.ct. debenture 104, 104¼, Southampton 88, 88½, Swansea 7 p.ct. preference 102½, 102¾, 102⅞, 103⅜. Supplementary prices, Southend 5 p.ct. "B" 88½. On Friday, Bombay 5⅜, Bournemouth "B" 12½, Brentford "A" 101, Continental Union 30, 7 p.ct. preference 80, Croydon sliding-scale 104, European 6½, Gas Light and Coke 92½, 92¼, 92½, 92⅜, 93 *ex* div., 3½ p.ct. maximum 61½, 63 *ex* div., 4 p.ct. preference 77¾ *ex* div., Imperial Continental 146½, 147½, Primitiva 5 p.ct. preference 31s., South African 8¾, South Metropolitan 96½, 96⅝, 97, 6½ p.ct. debenture 104½, South Suburban 5 p.ct. 100½. Supplementary prices, Southend "B" 89⅜.

The feature of the Money Market was the high average rate obtained for the Treasury bills, which jumped up nearly 6s. on the previous rate, to an average of £3 11s. 3·29d. This is the highest rate for over two years. The announcement caused an upward tendency in discount quotations; three months' fine paper becoming 3⅝ p.ct. The pressure for loans was less, and at the end of the week balances were offered at 2 p.ct.

There was a setback in the dollar-sterling as compared with the previous week from $4.34-$4.35½ to $4.29½-$4.32½. The primary cause was the persistent bidding for dollars on Amsterdam account. French francs were freely offered, closing at 94·60. Belgian francs moved in sympathy.

The Silver market was a little more active, the cash price closing at 33⅜d. per oz.

The Bank rate is 4 p.ct., to which it was raised from 3 p.ct. on July 5. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount house are 2 p.ct. at call and 2½ p.ct. at notice.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Divid. at Rate of	NAME.	Closing Prices, July 30, 1914.	Variation. Quotations, Feb. 8.	Variation. Lowest and Highest Prices of Transactions.
£			p.c.	% p.a.				
131,978	Stk.	Feb. 7	—	5	Aldershot 5 p.c. max. C.	..	70—75*	...
217,992	,,	,,	4	4	Do. 4 p.c. Pref.	..	68—73*	...
1,551,868	,,	Oct. 4	2½	5½	Alliance & Dublin Ord.	59—64	67—72	6½
374,000	,,	Jan. 10	4	4	Do. 4 p.c. Deb.	76—79	60—65	...
280,000	5	Oct. 18	7½	8	Bombay, Ltd.	5⅛—6⅛	5—5⅛	5⅛—5⅛
100,000	10	Aug. 9	—	8½	Bournemouth Gas and Water: B 7 p.c.	..	12½—13½	...
383,110	10	,,	7	7	Bournemouth Gas and Water: Pref. 6 p.c.	15—15½	11½—12½	12½
115,000	10	,,	6	6	Bournemouth Gas and Water: 4 p.c. Deb.	13½—14	11—12	...
162,025	—	Dec. 28	—	4	Brentford A Consolid.	..	75—80	...
992,045	Stk.	July 12	—	6⅜	Do. B New	..	98—103	99—101
734,920	,,	,,	—	6½	Do. 5 p.c. Pref.	..	98—103	99
55,000	,,	,,	5	5	Do. 4 p.c. Deb.	109—111	90—95	...
221,400	,,	Dec. 13	4	4	Brighton & Hove Orig.	91—93	76—81	...
214,745	,,	Aug. 23	11	11½	Do. A Ord. Stk.	208—213	175—180	176
244,200	,,	,,	8	8½	Bristol 5 p.c. max.	154—159	127—132	...
1,287,500	Stk.	July 26	—	5	British A Ord.	..	93—95a	91—91½
570,000	20	Oct. 4	12½	12	Do. 7 p.c. Pref.	44—45	117—122	117
100,000	10	Dec. 28	—	7	Do. 4 p.c. Deb. Stk.	..	12—125	...
120,000	Stk.	,,	4	4	Cape Town & Dis., Ltd.	88—90	73—78	...
100,000	10	,,	—	6	Do. 4½ p.c. Pref.	1½—2½	6½—7½	...
100,000	10	Oct. 31	—	4½	Do. 4½ p.c. Deb. Stk.	4—6	6—7	6½
150,000	Stk.	Dec. 28	4½	4½	Cardiff 7½ p.c. Deb.	70—75	73—78	...
257,860	,,	,,	—	7½	Chester 5 p.c. Ord.	..	105—110	...
157,150	,,	Aug. 9	5	5	Commercial 4 p.c. Stk.	108—110	85—90b	...
1,523,280	,,	July 26	5/9/4	6	Do. 3½ p.c. do.	106—108	92—97	93½—95
560,000	,,	,,	5½	6	Do. 5 p.c. Deb. Stk.	103—105	92—97	93
475,000	,,	Dec. 13	5	5	Continental Union, Ltd.	69½—72½	56—60	56
600,000	,,	14 Jan. 15	4	—	Do. 7 p.c. Pref.	76—79	30—35	30
200,000	,,	Dec. 13	7	7	Croydon sliding scale.	115—118	78—83	80
660,000		Aug. 9	—	6½	Do. max. div.	..	102—105	103—104
284,975		,,	—	5	Derby Con. Stk.	..	85—88	...
492,270	Stk.	—	6	4½	Do. Deb. Stk.	125—125	107—110c	...
55,000	,,	—	4	4	East Hull 5 p.c. max.	102—104	74—76c	...
209,000	,,	—	5	5	European, Ltd.	..	..	...
1,002,180	10	Jan. 24	10	2	Gas Light and Coke: 3½ p.c. max.	17½—18	6½—7½	6½—6⅝
16,546,120	Stk.	Feb. 7	4/17/4	5½	Gas Light and Coke: 4 p.c. Con. Pre.	98—102	92—94*	9⅜—90
2,600,000	,,	,,	3½	3½	Gas Light and Coke: 3 p.c. Con. Deb.	76—79	61—64*	61½—63½
4,062,235	,,	,,	4	4	Gas Light and Coke: 10 p.c. Bonds	96—99	76—79*	77—77⅜
4,761,930	,,	Dec. 13	5	3	Gas Light and Coke: 7½ p.c. Ilford Deb.	72½—74½	57—60	58—to
130,000	,,	Dec. 11	10	10	Hastings & St. L. 5 p.c.	..	..	...
42,000	—	—	—	7½	Do. 3½ p.c.	..	..	...
82,500	,,	Sept. 19	5	6⅔	Hongkong & China, Ltd.	87—89	93—98	...
958,740	,,	,,	3½	5⅔	Hornsey 7 p.c.	16½—16⅔	78—83	...
70,000	10	Oct. 18	11	10	Imperial Continental	..	16—17	...
86,600	Stk.	Aug. 23	9	9½	Do. 3½ p.c. Deb. Red.	150—160	144—149	...
1,976,000	,,	Nov. 15	9	5	Lea Bridge Ord. 5 p.c.	84—86	144—149	140—149
401,400	,,	Feb. 7	3½	3½	Liverpool 5 p.c. Ord.	119—121	72—75*	...
235,242	,,	Aug. 9	6½	6½	,, 7 p.c. Pref.	—	95—100	...
1,127,240	,,	Aug. 23	—	5½	Maidstone 5 p.c.	..	89½—90½b	106½
600,000	,,	Sept. 19	—	7	Do. 3 p.c. Deb.	—	105—108b	
165,736	,,	Aug. 23	7/5/6	9	Malta & Mediterranean Met. of Melbourne: 4½ p.c. Deb.	..	125—130	...
63,480	,,	Dec. 28	—	—	Montevideo, Ltd.	—	54—59	...
75,000	5	Dec. 13	6	5	Newcastle & Gatsh'd Con.	99—101	95—98	...
50,000	100	Oct. 1	4½	4½	Do. 4 p.c. Pref. Stk.	..	54—59	...
541,920	Stk.	Nov. 29	4	4	Do. 3½ p.c. Deb.	98½—99½	84½—85½d	85½—85½
1,875,892	,,	July 26	4½	4½	North Middlesex 10 p.c.	..	74½—76½d	...
250,166	,,	Aug. 9	—	4	,, ,, 7 p.c.	82—83	72—73d	...
329,705	,,	Dec. 28	3½	3½	Oriental, Ltd.	14—15	16½—17½	...
15,000	10	Aug. 23	—	11	Plym'th & Stonh'se 5 p.c.	117—122	11½—12½	...
75,940	10	,,	7/14/0	7⅞	Portsea Island, B	..	97—102	...
900,000	Stk.	Nov. 29	8	9	Do. C	128—131	105—110	...
138,120	Stk.	Dec. 28	—	7½	Primitiva Ord.	118—121	105—110	...
60,000	50	Sept. 6	13	13	Do. 5 p.c. Pref.	4½—6	100—105	...
100,000	50	,,	12	12	Do. 4 p.c. Deb.	4½—5	⅛—⅛	7/3—8/-
1,450,345	5	29 Oct. 14	8	—	Do. ,, ,, 1911	91—93	1½—1⅝	30/—32/-
2,499,800	5	30 Dec. 15	5	—	Do. B. Aires 4 p.c Deb.	85—87	70—75	...
341,400	100	Dec. 3	4	4	Do. Riv. Pl. 4 p.c. Deb.	85—87	54—57*	...
600,000	Stk.	Jan. 24	4	4	San Paulo: 6 p.c. Pref.	10½—11	55—58	...
220,335	,,	Dec. 28	4	4	San Paulo: 5 p.c. Deb.	47—49	55—58	...
321,670	,,	,,	4	4	Sheffield A.	..	5½—6	...
150,000	10	Oct. 4	6	6	Do. B	..	37—40	...
125,000	50	Jan. 2	5	5	Do. C	..	100—102e	...
270,000	Stk.	Aug. 23	—	5	Shrewsbury 5 p.c.	..	100—102e	...
419,968	,,	,,	—	5	South African	..	99—101e	...
1,047,000	,,	,,	—	5	South Met. Ord.	10½—11½	7—9	8½
133,201	Stk.	—	4	6	Do. Red. Pref.	111—113	95—98	96½—97½
90,000	10	Oct. 18	9	6	Do. 3 p.c. Deb.	..	97—99	...
1,600,805	Stk.	July 26	5/9/4	5	Do. 5 p.c. Deb.	72½—74½	57—60	59
104,580	,,	Jan. 10	—	5	South Shields Con. Stk.	..	103—105	103½—104½
1,895,445	,,	,,	3	3	S'th Suburb'n Ord. 5 p.c.	157—159	136—138d	...
734,000	,,	Sept. 6	—	6½	Do. 5 p.c. Deb. Stk.	114—116	97—102	99—100½
91,500	,,	Aug. 23	8½	8½	S'th'mpt'n Ord. 5p.c. max	116—118	95—100	97½
1,087,725	,,	,,	6	6	Do. 4 p.c. Deb. Stk.	99—102	86—89	88—88½
368,837	,,	Dec. 28	5	5	Swansea 7 p.c. Pref. Stk.	..	74—79	...
647,740	,,	Nov. 15	5	5	Do. 6½ p.c. Deb. Stk.	..	102—104	102½—103½
121,275	,,	Dec. 28	4	4	Tottenham and District: A 5 p.c.	..	102—104	...
250,000	,,	Aug. 23	—	7	Tottenham and District: B 3½ p.c.	135—138	122—127	...
200,000	,,	Dec. 28	—	6½	Tottenham and District: 4 p.c. Deb.	115—117	100—105	...
120,000	,,	July 26	—	8	Tynemouth 5 p.c. max.	87—89	77—81	80
882,275	,,	,,	6	6½	Wandsworth, Wimbledon, and Epsom—Wandsworth A 5 p.c.	108½—109	89—91d	...
181,255	,,	Dec. 13	4	4	Do. B 3½ p.c.	151—156	132—137	...
258,251	Stk.	Aug. 23	5	5	Do. C.	129—134	110—115	110
30,000	,,	July 12	8½	9	New Ordinary	110—115	98—103	...
255,636	,,	,,	6½	7½	Wimbledon 5 p.c.	..	..	...
108,075	,,	,,	5/17/3	6⅝	Epsom 5 p.c.	117—122	105—110	107—110
140,865	,,	,,	—	6⅝	3 p.c Deb. Stk.	121—126	110—115	...
352,000	,,	,,	6½	7½		66—69	56—61	...
98,000	,,	,,	6½	7½				
88,416	,,	Dec. 28	5	5				

Quotations at:—*a.*—Bristol, *b.*—Liverpool, *c.*—Nottingham, *d.*—Newcastle, *e.*—Sheffield. * Ex div.

A Gas-Works Sale in Scotland.—The shareholders of the Stonehouse Gas Company, Ltd., have passed a resolution sanctioning the sale of the undertaking to the Lanarkshire County Council, at a price of £10,000. The officers and Directors are to be compensated for loss of office, and a grant of £50 is to be made to the oldest employee and £10 each to two others.

Pudsey Gas Company.—The sales of gas by the Company during the past year show an increase of 2·29 p.ct. compared with the quantity disposed of in 1922. On Jan. 1, 1923, the price of gas was reduced to 9·8d. per therm, and a further reduction was made on July 1 to 9·2d. As from the beginning of this year, the Directors have made a further reduction to 8·4d. per therm. A dividend is recommended at the rate of 10 p.ct. per annum on the new consolidated 7 p.ct. stock.

South Staffordshire Mond Gas Company.—The Directors report that during the year ended Dec. 31 about 5 p.ct. more fuel was gasified and 11 p.ct. more gas distributed than in 1922, though trade in the districts served by the Company's mains was bad throughout the year. There are now indications of improvement, and an increasing demand. The net profit for the year is £9308. In view of the amount of the bank overdraft (£52,211), the Directors do not recommend the payment of a dividend on the preference shares.

Grantham Gas Company.—Mr. J. G. Thompson presided at the recent half-yearly meeting of this Company, when a report was presented showing for the period under review a profit of £3411, of which £1000 had been placed to the reserve fund; the Directors recommending payment of the statutory dividend of 5 p.ct. per annum on the consolidated stock, less income-tax. After the substantial reductions in the price of gas during the preceding half-year, they were unable to make any further concession, especially seeing that coal was dearer, and that wages were raised from Jan. 1 last, under the sliding scale agreement of the National Joint Industrial Council. The report was adopted, and the dividend recommended declared.

"Fat Deacons" and Gas Shares.—It is pitiful to think that the advocates of electricity in the place of gas lighting which has proved satisfactory for years should be reduced to such forms of argument as that of Mr. W. Plowman at the Malton and Norton Board of Guardians recently. In moving the adoption of electric lighting at the workhouse, he said there would have been electric lighting in most of the churches of the district by now (though it is difficult to see what the lighting of churches has to do with the lighting of the workhouse), but "that there were a lot of fat deacons who had shares in the Gas Company, and the parsons dare not bring it up." The Board were so impressed by this convincing argument that they requested Mr. Plowman to alter his proposition to refer the matter to the consideration of the House Committee, and carried it in this form.

Gas for Walney Island.—The laying of gas and water mains from Barrow-in-Furness to Walney Island, a work which has occupied about a year, is on the point of completion. Though there was an electricity supply on the island, where there are industrial works and residences, there has been no gas, and when the time came for renewing water mains it was felt to be a suitable opportunity to instal gas, which the householders are welcoming as a boon. The work has been a big undertaking, because of the laying of the mains across the channel, which has necessitated the employment of divers.

The Penistone and District Gas Company have notified their customers of a further reduction in the price of gas by 1d. per therm, equivalent to 5d. per 1000 c.ft. The new price will be 1s. per therm.

The Highways Committee of the London County Council have accepted the offer of the Gas Light and Coke Company to carry out certain alterations required for improving the lighting of Waterloo Bridge, for the sum of £78, and have sanctioned expenditure not exceeding £85 in respect of the work and any extra work that may be found necessary.

With the concurrence of the Finance Committee, the Public Control Committee of the London County Council have agreed to charge only the statutory fee of £18 16s. for testing and stamping a gas-meter of a measuring capacity of 50,000 c.ft. an hour, for use at the British Empire Exhibition at Wembley. In view of the high fee, which will more than cover the actual cost to the Council of testing, the payment of the additional expenses (approximately £4) normally chargeable in respect of inspector's time, conveyance of test meter, &c., will be remitted.

Members of the Bradford Corporation Gas Department Cricket Club and their friends, to the number of over a hundred, gathered at a whist social, at the Silver Grill Café, on Jan. 30, to celebrate the winning of the Whitfield Cup and players' medals and prizes in the annual competition among various industrial works teams in Bradford. The team had won the cup for the second year in succession, and if they should win it next year it will become their property permanently. The chair was occupied by Mr. Charles Wood (Engineer and General Manager to the Bradford Gas Department), who is President of the Club; and he was accompanied by Mrs. Wood, and supported by the Chairman of the Gas Committee (Councillor George Walker), the Deputy-Chairman (Councillor Fred Wilkinson), and the Chairman of the Club (Mr. J. R. Waggett). Votes of thanks were heartily accorded the Chairman and Deputy-Chairman of the Gas Committee and Mr. and Mrs. Wood for their presence and encouragement of the Club.

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